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Collection and Field Note Book

No. 50

(Nov. 30, 1957 - Jan. 26, 1958)

(38917 -- 39316)

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F. R. Faberg
Bank #5

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77

39148

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34082
33052

F. R. Falbig

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

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Nov. 30 - road eastward along head of Gulf of ~~Thailand~~ Siam. Saline flats between the road and the sea are covered ~~by~~ locally by a purple tweed (S. fruticosa?), more generally by mangroves, mostly Avicennia. The Avicennia is mostly only 1-2 m. tall and seems to be harvested regularly for wood - bundles of wood ranging from finger size to wrist size are piled along the road and different patches are of different average heights. Occasionally, especially farther east, are taller patches of Rhizophora, the stilt roots very low, appearing to be about 1 m. tall. In some areas the mangrove has been cleared and coconuts planted on windrows of soil.

The road forms the boundary between saline and non saline conditions. On the seaward side there is little cultivation, on the landward side all is cultivated or in canals which are intensively used for fishing for small fish.

1957 Thailand

Dec. 1 - Satahip - headlands covered by secondary scrub vegetation showing striking examples of wind grooving, especially radiating up from small coves and running up over the lower ridges.

Sides of broad ravines coming down to sea have south exposures covered by a low scrub, north exposures by scrub boy tangled forests.

Dec. 1 Ko Kram (Island)

Flat coastal plain on side toward land, 1-5 m. above high tide. Covered by a few cultivated patches and much thicket and grass. The grass is in part a pure stand of Heteropogon contortus, the spikes twisted together in bunches (photo). Some of the openings are a mixture of Imperata, Eupatorium, Heteropogon, etc. The thickets are a tangle of small trees and shrubs, many of them semi-climbers, many very spiny

1957 Thailand

Dec. 1 – Ko Kram (Island).

T in spiny secondary thicket on rather low flat ground.

38917		Jasminum common	elongate spiny shrub.
1	18	Aglaia occasional	low shrub, 1 m. tall.
3	19	Amorphophallus very local in shade	petiole mottled.
2	20	Phyllanthus rare in light shade	erect shrub 0.7 m. tall.
3	21	occasional	slender shrub 2 m. tall
3	22	occasional	shrub 2.5 m. tall, leaves slightly glaucous beneath.
~~2~~		same in open grassy places	
2	23	Heteropogon contortus dominant locally	bunches of fruits conspicuous with awns twisted together.

Dec. 3 n.e. Wang Noi

1957 Thailand

Dec. 3 - Bus trip Bangkok to Pukae

Central plain - rice land submerged except top of levees.

Aquatic plants less conspicuous after leaving vicinity of Bangkok.

a few cult. patches of Nelumbium (flowering).

Aquatics seen in flower:

Nymphoides sp.

Scirpus grossus

S. malaccensis

Cyperus

Zizyphus trees on road embankment said to be from seeds thrown from cars.

Pithecellobium dulce also?

Typha reeds beyond Bangkok

Beyond this the water is not so high and a dark clay-like soil is exposed

Dec 3-

Dec. 3 Pukae Botanical Garden-

Low land along river, a dark soil (grumosol?). Gentle slopes are very stony (clithosol). Low hill a knoll covered by brushy secondary thicket, cleared around the edges with Eupatorium, Broussonetia, Xanthoxylum, Phragmites, etc. Caesalpinia, etc.

(photo of limits ~~mouth~~ beyond Pukae)

Dec. 3 - area around Lop Buri an old lake bed of black soil, underlain by marl. Mostly in rice, quite wet at this season.

Widely scattered trees, spreading crowns and low branching. Borassus common. Coconuts. Samanea. Dalonix. Zizyphus. Pithecellobium dulce. Mangifera.

Some pasture and ~~weedy~~ weedy fields, probably fallow, near city. Termite mounds.

Limestone hills covered by sparse to ~~dense~~ dense scrub mainly bamboo, scattered bare trees.

1957 Thailand

Dec. 3 – Pukae, northeast of Saraburi

~~in~~ edges of thicket on low hill of disintegrating rock

38924 Ipomoea — prostrate, corolla white.
2 on bare ground around
+ 25 Sida — suffrutescent herb; flowers orange.
occasional around
2 26 Phragmites karka — canes 3 m. tall; panicle fusiform in general shape, bronze-green.
common in
2 27 Solanum aff. verbaciifolium — shrub 2 m. tall; leaves pale green beneath; flowers white; fruit green.
occasional in
2 28 Boerhavia diffusa — prostrate, forming a broad mat, leaves pale green beneath; flowers pink, stamens mostly 2.
common around
(apparently same population as nos. 38931, 38936)
1 29 Ipomoea — twining in tall weedy growth; corolla tube campanulate, white, ~~throat~~ limb purple; stamens straight, stigma capitate.
rare in
2 30 (grass) — sprawling, elongate to 2–3 m.
occasional in
~~3 Boerhavia diffusa~~
same – ~~on~~ in open cleared field on low hill of disintegrating rock
3 31 Boerhavia diffusa — prostrate to somewhat ascending; flowers pink, stamens 2; leaves ~~dk~~ very pale beneath.
abundant ~~on~~
(apparently same population as nos. 38934, 38936)
1 32 Abutilon asiaticum — caespitose; culms almost erect,
occasional
2 33 Andropogon
common

1957 Thailand

38934 Biophytum
1 rare

3 35 Emilia sonchifolia
occasional locally

2 36 Boerhavia diffusa
common (apparently same population as nos. 38928, 38931)

Dec. 3 - Lopburi
waste place along street

2 37 Portulaca quadrifida L.
common locally in

Dec. 3 - 10 km. east of Chainat

2 38 Oryza sativa var. spontanea
very common in edges of wet rice fields

Dec. 3 - Chainat Dam, Chao Phaya

2 39 (Cyp.)
stone embankment of inside reservoir, flooded at high water

Dec. 3 - northeast of Wang Noi, Central Plain
muddy edges of ditch along rice field

1 40 (Acanth.)

1 41 Monochoria
common

1
good weeding

flowers purple, not much exceeding involucre ascending, leaves whitish beneath, flowers pink, stamens mostly 2.)

prostrate, purplish, fleshy; ~~flowers~~ leaves opposite; flowers yellow, petals 4, stamens about 8.

culms ascending

prostrate, extensive; flowers white; fruit immature.

prostrate; flowers white

erect; flowers bright purplish blue.

1957 Thailand

Dec. 3 - Bus trip from Lopburi to Chainat

The land very gradually rises after leaving the very flat lake bed area of Saraburi (about 200') to a maximum, on the road, of about 500', before the descent to the Central Plain at Chainat starts.

Lopburi?

As the land rises, cultivation becomes less, the scattered trees more abundant until thickets and patches of open forest form a mosaic with patches of savanna and cultivation. Many kinds of trees are involved, including Dipterocarpus alatus and Careya umbraculifera. The latter is locally common on the highest part of the road and most of the larger Careya trees are in flower, a magnificent sight. A few were already past flowering and dying.

As the descent starts cultivation increases. This area is a cooperative homesteading project and is being cleared. The govt. loans money to start, and

assigns a family 5 hectares of land, which becomes family property after 10 years of cultivation.

The hills from Lopburi almost to the edge of the plain are of limestone, fantastically eroded into vertical fluted karsts. The slopes of these are covered by woods in various stages of degradation. Some are covered by little but spiny bamboos, others with loose scrub, some with denser scrub. One was noticed with some grass on top, but with scattered bushes & trees. The few hills with even scrub forest are being actively exploited for charcoal.

The nearest hill to the Central Plain seems to be of sandstone, judging by the amount of sand at the base, as well as by its non abrupt appearance.

Bamboo is prominent in all landscapes. In places it forms veritable barbed wire entanglements.

Dec. 4 Chainat Dam
Floating islands of ? Pomaea aquatica Cult. On board (photo).

Dec. 4 - Nakonsawan Sarvan
teak logs being assembled in rafts (photo).
In market - Durian, Tangerine Achras, sea bitter orange.
Parkinsonia crossa, Spondias mangostan

Dec. 4 Ban Daen, Nakonsawan

Abrupt jagged hills of massive limestone.
Steeper slopes sparsely vegetated, lower slopes wooded.
Many characteristic shrubs a cereoid Euphorbia, Dracaena ?, Sphenoderma, Premna, Bridelia, etc. (photo)

Dec. 4 - Talok Banta
remnants of old forest.

~~Dec. 4 Kamthaeng Phet~~

Dec. 4 - Chainat to Nakonsawan - Granite hills with thin latosolic soil near road - soil on flat ground rather poor, some under cultivation, some in thicket.

after leaving hills most of land is in rice with scattered trees and termite mounds

- Nakonsawan to Talk - rather sterile soil for some distance with thickets, some cultivation. Then an isolated range of limestone hills. Much of the country degraded to thickets of spiny bamboo.
Beyond Banphot Chisi mainly flat country formerly evidently in mixed deciduous forest, cleared or degraded to varying extents.
Degradation here takes an unusual form - the shrubs and small trees are taken out for charcoal, leaving more or less the large trees. These, locally, are dipterocarps (Dipterocarpus spp., Shorea spp.), locally Lagerstroemia, and many others. The areas where the trees are very sparse are

(over)

1957 Thailand

Dec. 4 – Nakhon Sawan, roadside

3894		Alternanthera sessilis ?	prostrate, forming a mat.
3			
4	43	Tribulus cistoides L. common	prostrate; ~~flowers~~ petals yellow, less than 1 cm. long.
	~~44~~	~~Sphenodesmus~~	

Dec. 4 Ban Daen, northwest of Nakhon Sawan on steep jagged hills of fluted limestone

3	44	Sphenodesmus occasional	shrub 2 m. tall, bracts and calyx pale green.
1	45	Hedyotis common in crevices	all plants seen completely dried.
2	46	Premna common	shrub 1 m. tall, fruit green.
4	47	Premna common	shrub 1.5 m. tall, flowers pale green, scarcely any odor.
2	48	Bridelia common	shrub, elongate branches; leaves glaucous beneath;
2	49	Trichosanthes common	fruit immature.
			vine, climbing in bushes and on rocks. flowers white, fruit red, soft when ripe, ripening from apical end.
2	50	Achyranthes ~~common~~ on ledges	erect.

Chao Phraya River

30 m. ↓

50-100 m.

Dec. 4 Talok Banta, ~~Loei~~
near Khana, 60 km. south
east of Kam Phaeng Phet
cleared flat land
along road.

38951 Phaseolus

~~2 52~~
~~2 53~~ Pentacme siamensis (Miq.) Kurz
~~2 54~~

2 53 Hedyotis
common under remaining trees

1 54 Dipterocarpus obtusifolia
2 remaining from former forest

Dec. 4 - Kam Phaeng Phet.

4 55 Loranthus
parasitic on mango tree

50 m.
↓

~~Loei~~ twiner; flowers with
maroon calyx and standard,
yellow wings, pale green
keel.
tree, stout.

erect; flowers white.

tree 25 m. tall, ~~Loei~~ bark
longitudinally fissured
into ridges; leaves,
stipules and corolla from
ground beneath tree.

mae
Ping (River)
70 m.

woody plant about 1 m.
long, branched; corollas
laterally compressed,
tube coral red, lobes
yellow with green
area near base.

1957 Thailand

(Cont. from p. 19) mostly planted & nice. Where somewhat denser there is a grass ground cover, rather tall (1 m. ±) with occasional clumps of Thysanolaena gigantea up to 2 m. or more. Much of this is rather choked by brush, saplings, bamboo, etc. In other areas, more open, there is conspicuous regeneration of Dipterocarpus, Shorea, etc. with little or no undergrowth.
In places, especially just south of bridge over Ping River, are areas of open, thin forest that have been little changed, with many very large buttressed trees. This forest is irregular, with considerable undergrowth, & in places rather open. Nowhere is the canopy complete.
This forest is all probably burned over quite often but shows few clear signs of it.

(Rahaeng)

Dec. 5 – Ban Tak.
Village with large tree old cult: ground, bottom land (photos).

Dec. 5 ± 1 hr. n. of Rahaeng
dry dip. forest. (photos)
degraded

Dec. 5 Ban Masalik 30 ± hr. n. of Tak
Old weathered low granite knobs protruding from plain – very degraded dry deciduous forest (photos). very eroded.

~~Ban Hoay~~

Dec. 5 - from Talk to Thoen

The route lies mostly over low rolling hills covered by open forest. Some cultivation along streams, but soil elsewhere very thin a clay of a coarse sand & fine gravel derived from granite. Low hills covered by quartzite pebbles and cobbles embedded in clay soil, this almost all eroded away leaving a sort of pavement.

The forest varies some in height and density but is scrubby at best and seldom has the trees touching, sometimes very open. Grass & herbs and low shrubs between, some large shrubs. Cycas ~~sa~~ siamensis common.

The forest is a very degraded "deciduous dipterocarp" type, several dipterocarps common but also various other trees.

The whole area

seems to be burned frequently in the dry seasons, and is also heavily grazed.

North of MaePhik there is a border area of completely & almost completely cleared land, some in rice, some in thicket ~~of~~ various stages of development. This then gives way to secondary forest again, ~~a~~ partly choked by spiny bamboo.

A range of wooded hills to the east ~~of~~ from north of MaePhik at least to Thoen which does not show on map.

1957 Thailand

Dec. 5 – Ban Tak (Rahaeng), north of Tak, Mae Ping (River) around thickets and garden patches in village (lab.) — 110 m.

38956 — corolla pink, end of lip maroon; plant with little or no odor.

2 57 Plumbago zeylanica L. — elongate herb; corollas white.

2 58 Urena lobata L. — herb 1 m. tall, flowers rose pink.

2 59 Urena — herb 1-2 m. tall; flowers bright rose pink.
common

Dec. 5 – 2 km. n. of Ban Tak (Rahaeng), north of Tak, Mae Ping River) in dry sparse scrubby woodland on thin stony soil. — 120 m.

1 60 grass — small dense tufts.
common in openings, badly grazed and trampled.

3 61 Paronychia — flowers pinkish
occasional

4 62 Evolvulus — flowers blue
~~rare~~ occasional

1 63 Euphorbia — gland appendage white.
rare

1 64 Commelina? — stem fleshy, bronze color; inflorescence already dry.
rare

5 65 Cycas siamensis — stem about 5 dm. tall, 12 cm. thick, old leaf bases charred; cone immature.
common locally

2 66 Cycas siamensis — stem about 3 dm. tall, 1½ cm. thick, old leaf bases charred.
common locally

38947		Cycas siamensis common	very young plants with "phycombiza"; subterranean stem bulbous, roots fleshy.
1	68	(leg.)	small tree or large shrub.
2	69	Boreria? common	erect
4	70	Helicteres very common	suffrutescent herb, stem ascending to spreading; flowers purple.
1	71	Eupatorium odoratum abundant generally	herb 1-1.5' m. tall, flowers lavender. fragrant.
1	72	Selaginella in open, full sun.	
1	73	(annon.)	fruit red.
1	74	(Leg.) Uraria rare	bracts purplish
4	75	Grewia common	low shrub up to 0.6 m. tall.
1	76	Curcuma occasional, mostly sterile.	
2	77	(acanth.) occasional	flowers violet
4	78	Ternstroemia?	
		Dec. 5 - Ban Masalik, 50 km. n. of Talz, near Wang (River) in very open woodland on and around weathered granite boulders, coarse soil	1140 m. ↓
1	79	Hedyotis	flowers white.
2	80	Cassia chamaecrista?	flowers yellow, calyx maroon.
2	81	Lindernia	flowers purple and white.

1957 Thailand

38982		(asclep.)		
2		occasional, climbing in bushes.		vine with pale green leaves, very glaucous fruit
1	83	Terminalia alata common		small tree
1	84	Lespedeza common		slender shrub
		Dec. 5 - Thoen, Mae Wang (River)	150 m. 500'	
	85			
2	85	Sterculia pexa in village, probably spontaneous.		small tree ~~flow~~ flowers yellow, turning deep orange
		Dec. 5 - mountains between Thoen and Ilo	580 m. 1900'	
4	86	Desmodium occasional on bare road cuts		shrub, branched at base; flowers blue-purple and white.
		Dec. 5 - Ilo	480 m.	
2	87	Salix common along stream		small tree
		Dec. 5 - about 20 km. south of Ban Hong, about 70 km. south of ~~Chiang~~ Chiang Mai	430 m. 1400'	
		deciduous open Dry dipterocarp forest		
3	88	Elephantopus common on open soil		flowers rose purple
1	89	(leg.) occasional in openings		
1	90	Verbena rare in opening		flowers magenta

1957 Thailand

38991 Lida cordifolia L. det. Fryxell, 19
3 common on bare soil in open
2 92 Graphalium
occasional in opening
1 93 Brideliq
2 94 Dipterocarpus obtusifolia
common

Dec. 5 - west from Thoen
the low ground is
cultivated, slightly
higher ground is
in thicket and very
degraded forest, this
rather open. Ascending
into the mountains
the forest rapidly
becomes more dense
and much more
luxuriant in aspect,
a tall monsoon type
forest with straight
clear trunks but
without a complete
canopy, no very
definite layering
but with rather
dense undergrowth.

erect; flowers orange

flowers deep purple

small tree; ripe fruit
black.
trees to 20 m. tall; leaves,
& stipules, flowers, and
fruit, picked up on
ground under trees;
corolla pale pink,
lobes rose pink within,
with unpleasant odor.

Locally on steep slope
a tall arching bamboo
forms thickets. The
forest is at this
season very green,
but is said to be
deciduous a little
later. Some dipterocarps,
much Lagerstroemia
(photos). Trees to 30+ m. tall.
Coming down somewhat
into a broad flat
valley, cultivation
becomes locally dominant,
the forest is open and
of small stature, drier
than in mountains, has
suffered much from fire.
From Ban Hong north there
is much cultivation.

for pdem
wood cropping

1957 Thailand

Dec. 6 - ridge leading up to Doi Suthep, east slope of Doi ~~Suthep~~, west of Chiang Mai

— in thick ~~forest~~ broadleaf evergreen forest, mainly Fagaceae,

38995 Ardisia
rare

3 96 Lithocarpus
common

— in grassy ridge with abundant scattered trees and shrubs,

1 97 Eygodium flexuosum

3 98 ~~Lygodium~~ sp. sacking
very local

3 99 Polygonum chinense
occasional in margin of forest

39000 (genus.) (cf Eurycium?)
rare on open

1 01 Sonneratia
rare.

3 02 Aeginetia
common

1 03 (Melast.)
rare in bare soil at edge of trail

1 04 Justicia?
occasional

2 05 Justicia?
occasional

3 06 Hedyotis
occasional

1200 m.

— unbranched, erect, 1 m. tall, fruits scarlet. tree 10 m. tall, fruiting twigs lying on ground.

1200-1400 m. showing evidence of fire.

— climbing or shrub, culms ascending to erect.

— decumbent to ascending, flowers white, fruiting calyx enlarged, jelly-like

— rosette flat on ground, calyx maroon, fruit yellow.

— calyx red.

erect, flower deep purple.

flowers pink.

flowers blue

— corolla pink, upper lip edged with maroon, erect, leaves stiff, dark green above, white beneath; flowers white.

1957 Thailand

~~709~~ 39007 Osbeckia
common
2
3 08 (Lab.)
common
2 09 Anaphalis
occasional
2 10 Thelypteris?
common
1 11 (Herb.)
2 12 Hydrocotyle
occasional in edges of woods
13 Ophiopogon
occasional

~~wooded slope~~ lower summit
Dec. 6 – Boakha, on east
slope of Doi Suthep, west
of Chiang Mai
in open woodland with
grass, showing evidence
of fire.
1 14 Begonia siamensis
common shaded slopes
3 15 Carex cruciger
locally common
2 16 Vaccinium
epiphytic

2 17 Codonopsis
common climbing on grass
and shrubs

shrub 1–2 m. tall,
petals rose pink; fruiting
calyx reddish.
erect, to 1 m. tall; flowers
white.
involucre white, dull;
corollas yellow.

flowers yellow,
anthers dark brown.

fruits fleshy, globose,
bright blue.

1700 m.

fleshy, leaves blotched
red and green beneath.
erect

shrub: corolla tubular,
very slightly dilated
upward, constricted below
lobes, not fleshy, coral
scarlet, lobes green.
lactiferous twines; stems
maroon, leaves pale; calyx
maroon, fruit black.

1957 Thailand

3	18	Carex baccans rare
3	19	Helicia common
2	20	Dianella occasional
1	21	Peperomia reflexa epiphytic, rare
4	22	Blumea common
3	23	Gleichenia linearis var. fennigiana common
4	24	Indigofera occasional
2	25	Loranthus rare, parasitic
5	26	Polypodium common, epiphytic on tree trunks
1	27	(orchid) common, epiphytic on tree trunks
2	28	Columnea (or Aeschynanthus) occasional, epiphytic
4	29	Vittaria occasional, epiphytic
4	30	Trichomanes very local, epiphytic on tree trunks
2	31	Mucuna (or Stizolobium) common

erect, perigynia deep orange-red, fleshy; small tree; fruit immature

erect, leaves with scabrous margins, fruits globose, dark purplish blue, fleshy, fleshy

erect herb 1–1.5 m. tall, disk yellow.

low, not forming notable tangles, pinnules glaucous beneath.

shrub 1.5 m. tall, leaves distichous, inflorescence arising from plane of leafy branch.

fruit glutinous within, skin slipping off.

~~mostly~~ fronds mostly dry at this season.

leaves fleshy, appressed to bark.

flowers brilliant scarlet,

fruit elongate, linear.

pendent, leaves ~~coriaceous~~ papyraceous from dryness.

leaves curled from dryness.

vine climbing over bushes, inflorescence pendent, often covered with ants, bracts narrow, calyx purple, corolla blackish purple.

1957 Thailand

3903		Andropogon dominant grass	erect to ascending.
2	33	(grass) common	erect
3	34	Lithocarpus common	small tree
2	35	Lithocarpus common	small tree; flowers ~~pale~~ with unpleasant odor.
2	36	Lithocarpus common	small tree, fruits from ground.
2	37	Pieris common	small tree, fruit immature.
4	38	Pieris common	small tree

Dec. 4 - lower east slopes of Doi Sutep, west of Chiang Mai

1	39	Melastoma very common in open deciduous forest	600 m. small tree; flowers white, fruiting calyx scarlet, becoming so very young.

Dec. 6 - Doi Sutep

The lower slopes, below about 3500' are covered by a rather sparse scrubby deciduous forest with dipterocarps common. This seems to suffer from continual fires. Much regeneration locally. Few large trees. In upper parts of this are many large Castanopsis with tall clean trunks and spreading crowns. Some ravines here are rather moist and there are flowing streams. Above 3500' the forest changes to an evergreen type, dominated by many kinds of oaks, but with various other tree genera. In ravines and on some slopes this is dense, with canopy and

1957 Thailand

undergrowth. Generally the undergrowth is lacking and the canopy irregular. On ridges the trees are sparse, in places so scattered that the aspect is of woodland or even savanna-woodland with tall grass, especially andropogon sp. and some shrubs, ferns, etc. Many interesting herbs. Above 5000' this forest becomes much more scrubby. Epiphytes become more common and include Hymenophyllum, Vittaria, and other ferns, as well as much moss and many orchids. Gleichenia linearis is common in open places. There are open grassy areas with rather few trees. The general height of trees here is perhaps 8 to 15 m. The color is dull dark green. The moisture seems to become more abundant with altitude. Fires are said to sweep this forest annually, and ~~dead~~ dead logs, stumps, etc. seem to bear this out, as well as

the lack of undergrowth and general ~~stature~~ ~~and~~ physiognomy of the forest. A few pines on the extreme summit.

A small cycad with only one or two leaves seen, not commonly, at about 3600'.

1957 Thailand

Dec. 7 - Chiang Mai To Chiang Dao Road skirts edges of main area of rice cultivation. Low rolling ground has scrubby growth and thickets, some bamboo, obviously, judging by regeneration, ~~by~~ and scattered persisting trees, formerly deciduous dipterocarp forest. Patches of this remain in a degraded condition. Teak is common, both in patches of forest and around villages.

Finally, leaving the plain and entering hilly country the forest changes to "moist upper mixed deciduous forest."

This is also much degraded draped with vines, with abundant bamboo in understory. At ~~Chiang Dao~~ the Kaping at 1250' is a sizable tea plantation on slopes, shaded by Glricidia sepium. On the flat bottom land oranges are planted.

The common understory bamboo is Oxytenanthera. It is encouraged by burning. Indicates good soil for teak, also ~~for~~ such areas are favored for dry land rice cultivation. Cut close to

ground and allowed to dry and burn.

Tea plantation here dates from just after the war.

Canyon walls are wooded with a conspicuous grass understory. ~~Bo~~ Oxytenanthera also common in rocky places. At about 1700' Dendrocalamus is very abundant in places forming a thick forest.

Dec. 8 - Huey Yard 2900'

Flanks of ~~ridge~~ forest with conspicuous Dipterocarpus costatus with tall white trunks and spreading crowns.

Steep slopes here partly covered by forest, partly in tea plantations, the plantations mostly on rounded spurs, ravines wooded and containing small streams. The forest is tall, uneven, with generally a full canopy and many lianas. Trees perhaps 30 m tall.

Higher on ridges this forest is replaced by an evergreen moist oak forest. This is apparently burned frequently as undergrowth is sparse to absent.

1957. Thailand

Dec. 7 - ~~Khun Tan~~ Pass ~~Tan~~ → Kang Dan Tan 500 - ~~750~~ 750 m.
Canyon leading up to ~~Hill Station~~ Huey Tard, ~~Khung Dan~~
in ravine with moist deciduous forest.

39040 2		Ipomoea cordiver very common in weedy spring
2	41	(Tid.) in understory
2	42	Selaginella on dry rock cut above trail, wet in rainy season
3	43	Selaginella on dry rock cut above trail wet in rainy season
5	44	Selaginella abundant on cut bank of trail
2	45	Angiopteris rare near bottom of ravine
3	46	Selaginella vogelii? Spring common along trail
4	47	Selaginella common on wet banks
3	48	Maesa gregarious on steep ~~rock~~ slope
1	49	Lonchilla? rare in bare road cuts
3	50	Eulalia? dominant in ground layer in open forest
2	51	Angopteris rare along trail

from Mae Rampung, Chiang Dao, ~~Khung Dan~~ Huey Tard

Twiner climbing on bushes,
- flowers scarlet.
small tree, leaves
- glaucous beneath.
- plant closely adherent to substratum.

vegetative plant prostrate, fruiting branches erect.

erect.

fronds ascending, 3 m. long petiole and rachis with longitudinal white marks, glabrous.
- stem elongate, trailing,
- leaves iridescent.
drooping, spikes compressed

small slender tree, flowers white.

branched, elongate fruiting culms erect, 1 m. tall, spikes reddish.
- vine, flowers rose purple.

1957 Thailand

~~Dec. 7~~

3905 Lycianthes

3 53 Boreria laevis (Lam.) Griseb.
~~Dec. 7~~ rare along trail

53a Dryopteris

Dec. 7 - Ban Palat, Ma Chiang Mai, 34 km. n. of Chiang Mai
in drained rice fields

2 54 (grass)

2 55 ~~a~~ Marsilea
common

3 56 Zizyphus
along road

Dec. ~~8~~ 8 - Huey Tard, on mountains southwest of Chiang Dao
along paths near small villages

4 57 Sambucus

4 58 Dioscorea alata ? L.
rare in weedy thicket

3 59 Elaeagnus
common

3 60 Trachine ?
common in thickets

3 61 Solanum
in thickets

4 62
occasional

~~800 m.~~
~~2500'~~
↓
dense clump, leaves pinnatisect; flowers white.

350 m.
↓

small tree, flowers white, fruit immature.

950 m.
↓

erect 3 m. tall, flowers white, some modified to yellow glands. "sapan ha" (Northern Thai)

— twiner, twining to right. "man" (Northern Thai)

— scandent shrub, flowers cream color; "malot" Northern Thai.

— elongate to 3-4 m., forming tangles.

— shrub 3 m. tall, flowers white, fruit immature. "fa paha" (Northern Thai)

— ~~shrub~~ slender shrub, branches elongate, flowers yellow.

3 9063 Solanum
sarrachoides
3 64 Spilanthes
common
3 65 Eryngium foetidum L.
edges of cultivated patches
3 66 Lida acuta?
common
3 67 (Rabiata)
common

3 68 Drymaria cordata Willd.
common

home -
wet wooded
ravine, thin soil on
granite.

2 69 Cissus?
common
3 70 Ficus

2 71 Berberis?
common in wet bottom
B 72 Ficus
lower story shrub
in ravine bottom
2 73 Panicum
wet ravine bottom
2 74 (Commel.)
common in wet bottom of ravine
2 75 Pipturus
common in wet bottom

shrub 2 m. tall, flowers
purplish; fruit red.
— spreading herb,
— flowers pale yellow.
Odor very bad; used
in cooking.
— branches distichously
arranged.
— aromatic herb, flower
yellow and maroon.
— "horn peng" (northern Thai)
plant more or less
prostrate, branchy
bearing erect,
fruiting pedicels viscous,
reducers.

woody vine, climbing
— in trees; fruit immature.
tree 20 m. tall; figs green,
— globose.
erect herb 1 m. Tall;
flower violet.
— drooping elongate shrub
ripe figs reddish.

erect from prostrate stem,
fruit blueish.
— Tangled shrub fruiting
receptacles fleshy, white.

1957 Thailand

Dec. 8 – slopes above 1300 – 1300 m.
Huey Tard, mountains southwest of Chiang Dao
on wooded ridge

39076 Pratia
common on shaded + bare spots on ridge.
prostrate, fruit dark red.

2 77 Davallia
common on mossy banks and rocks.
fronds all dry, very loosely articulated & obligate.

1 78 Baccisolepis
~~Oplis~~ bare soil on ridges

1 79 Selaginella
common on bare soil

2 80 Lindernia
common on bare soil
corolla white, lips purple above.

2 81 (grass)
common in rocky places

2 82 Exanthus
parasitic on Lauraceae

2 83 Wendlandia paniculata DC.
occasional
understory tree

2 84 Argyreia
occasional
twiner, flowers rose purple

1 85 Eurya
occasional.
small understory tree
– flowers white.

1 86 Codonopsis
occasional
vine, flowers white,
– fruit black.

2 87 (Leg.)
occasional, climbing in trees.
vine, bracts pale green.

4 88 Peristrophe
occasional
erect herb, flowers purple.
–

2 89 Castanopsis
common.
tree 20 m. tall, fruits from ground.

1957 Thailand

39090		(grass)	
		on rocks in thinshade	
1	91	Lemmida	
		rare on bare soil	flowers pink.
1	92	Panicum	
		occasional along trail	
2	93	Torenia	
		occasional	flowers white, purple within.
1	94	Paspalum	
		rare along trail	
3	95	Viburnum	
		occasional in understory	shrub 3 m. tall, buds only.
1	96	(Lab.)	
		rare	flowers lavender.
2	97	Micromelum?	
		rare in undergrowth	shrub 2 m. tall, bud only.
2	98	Thelypteris	
		occasional	
3	99	Dalbergia	
		common	shrub 2.5 m. tall.
39100		(Conv.)	
2			twiner, fruits bluish, reddish, immature, flowers pink.
3	01	Impatiens	
		common	
2	02	Thelypteris	
		very common	
2	03	Colens	
		common	erect
	04	~~Asplenia~~	~~erect~~
		~~common in ft~~	
2	04	Asparagus	
		occasional in open woods	plant arching; fruit orange
4	05	Styrax benzoides	
		common in understory	small tree.

1957 Thailand

39	104	(grass) occasional	
1	07	Habenaria rare, terrestrial	erect
1	08	Crotalaria	— fruits immature
2	09	Phlomis occasional	erect, flowers yellow; fruit drang.
3	10	Humata occasional, epiphytic	
1	11	Adiantum rare	
1	12	Clerodendrum rare	shrub; inflorescence white.
2	13	Asystasia occasional	erect; flowers — pale lavender. flowers white.
4	14	(rub) locally common	herb to 0.7 m. tall; fruit black when ripe.
3	15	Lee occasional	
3	16	Pteris occasional	
3	17	Costonopsis rare	vine-like, flowers white.
1	18	Thunbergia coccinea rare	vine-like herb, flower red, yellow in throat.
1	19	Pinanthus occasional	herb 1 m. tall.
2	20	Triumfetta in edges of forest	herb 1 m. tall
3	21	Triumfetta in edges of forest	fruits prickly hyp fruit ground
1	22	Costanopsis	

1957 Thailand

same — in Ex. tea plantation

39123 Theq
3 planted

2 24 Liegesbeckia orientalis L.
weed in
2 25 Lencas
weed in
24 Vitis vesicata
in thicket
2 27 Hygrodium flexuosum
common
2 28 (Acanth?)
common weed
~~2? Tylos Flemingia?~~
~~common in open woods~~
~~between~~
— in open woods
4 29 Flemingia?
common
1 30 Disporum
rare
1 31 Rauwolfia
rare
1 ~~32 Centaurea?~~
re

Dec. 8 — ridge top above Huey Tard, mountains south west of Chiang Dao
open evergreen oak woods, burned frequently
1 32 Centaurea
rare
4 33 Dendrobium?
epiphytic

small tree 4 m. tall (mostly trimmed down to shrub size), petals white.
— erect herb 1 m. tall, flowers yellow.
— herb, flowers white.

herbaceous vine
— leaves flecked with white.
climbing on shrubs.

flowers blue.

erect herb, 1–2 m. tall,
flowers pinkish.
— fruit black, pendent,
leaves glaucous.

fruit scarlet

1300–1400 m.
Dao

erect to 1 m. tall, flowers purple.

flowers pale yellow

1957 Thailand

39	39	Eurya occasional		small understory tree
2				
2	33	Callicarpa rare		fruit purple.
	36	Osbeckia common		erect 1-2 m., petals rosepink.
2	37	grass occasional		
2	38	Thunbergia alata Sims occasional		twiner; flower white.
2	39	Crassocephalum common		heads nodding, reddish to yellow.
3	40	Adenostemma rare		flowers white.
2	41	Vitis rare		vine, ♦ inflorescence purplish red, fruit reddish.
3	42	Lithocarpus common		large tree
2	43	Antrophyum? epiphytic		fronds dried and curled.
1	44	Vittaria epiphytic		fronds dried and curled, pendent.
2	45	Plectranthus or Coleus occasional		aromatic herb; flowers white.
1	46	(orchid) rare, ~~epiphyte~~ epiphytic		erect.
1	47	Hedyotis rare		flowers yellow.
1	48	Crotalaria rare		erect.
2	49	Desmodium rare		erect, 1 m. tall; flowers purplish blue.
2	50	Desmodium occasional		

3 9 15) Euonymus
2 occasional
1 52 Amomum
occasional
5 53 Glevia
rare
2 54 Clerodendrum
rare

Dec. 8 - Village near Huey Tard

2 55 Eupatorium
occasional

Dec. 8 - near village near Huey Tard.
1 56 Costus
1 57 Commelina
1 58 Tagetes
around abandoned cultivated field
1 59

Dec. 9 - Huey Tard

Tea plantation on steep slope
1 60 Clerodendrum fragrans
edges of
2 61 Phoebe
tree left in plantation

small understory tree;
fruit scarlet.
fruiting spike red.

shrub 1 m. tall,
fruit green.

erect shrub 1.5 m. tall;
bracts purple.

flowers white.

950 m.

bracts red.

petals blue.
malodorous herb,
flowers orange.

flower purple

950 m.

herbage pretid when broken,
calyces maroon, corolla white.

1957 Thailand

Dec. 9 - Chiang Dao Cave - place where a stream issues from base of limestone massif - Doi Chiang Dao (photos)
The mountain has not been well botanized, especially the top 1000'. Very difficult to ascend. Some curious grassy areas high on the side of the mountain - must be result of lightning fires. Otherwise wooded except on cliffs and ridges.

Dec. 9 - Kang Dao Tao, canyon above The Kanning
in moist deciduous forest on canyon sides

39162 Selaginella
3 on bare soil of cut bank above trail.
3 63 Mereseia;
occasional on steep slope
4 64 Dipterocarpus obtusifolia
common

Valley below is variously cultivated. Bamboo thickets and trees common. Landscape appearing wooded, but really largely cultivated.

Dec. 9 Mae Chaem 73 km.
n. of Chiang Mai
Patch of mixed deciduous forest on slightly sloping ground. Trees spaced 5-10 m. about 25-30 m. tall, canopy perhaps 3/4 complete. Trunks up to 5-6 dm. thick above buttresses or swellings, over 50% Tectona, some Dipterocarpus tuberculata, several other tree species. Undergrowth mostly herbaceous, some seedling Tectona etc. Teak leaves falling, some herbaceous vines. Soil fine, dark gray.

500-800 m
1500-2500'

vegetative branches prostrate, adherent to soil, fruiting branches erect.
culms 2 m. tall, upper part paniculate.
tall tree, 25 m. tall, trunk clear, 6 dm. thick; material from ground beneath tree; flowers deep pink.

1957 Thailand

Dec. 9, Me Raming, south of Chiang Dao
along stream in cultivated land

39165		Salix tetrasperma Roxb.	385 m. +450
4		single tree persisting	tree 12 m. tall, diffusely branched.
3	66	Cyanotis	elongate juicy vine, flowering branches erect; flowers purple, 3 petals equal.
		in thick weedy growth,	

Dec. 9 - Mae Ping (River), above Me Raming, below Chiang Dao

4	67	Salix tetrasperma Roxb.	385 m. +450
		scattered tree along river	small shrubby tree
3	68	Salix tetrasperma Roxb.	small shrubby tree
		scattered trees along river	
2	69	Polygonum	prostrate, good flowering branches erect.
		edges of river	
1	70	Thelypteris	fronds elongate, whip-like, rooting near tips, producing small plants.
		river bank	

Dec. 9 - Chiang Dao Cave base of Doi Chiang Dao

2	71	Coranthes	460 m. +500
		parasitic on citrus in village	flowers ocher yellow with green stripes on tube.
1	72	Aleurites moluccana Willd.	small tree.
		planted in temple ground	
2	73	Spirodela polyrhiza (L.) Schleid	
		floating in pond	

1957 Thailand

Dec. 9 – Mae Chan, 2½ km. n. of Chiang Mai in mixed deciduous forest

3917.74 Lindsaya
3 at base of tree
2 75 Dipterocarpus obtusifolia occasional
1 76 Antiderma in undergrowth

Dec. 10 – Chiang Mai airport
1 77 Sorghum
weedy places near muddy pond

Dec. 10 – Air Trip Chiang Mai to Bangkok (left side of plane. Rice fields below Chiang Mai are all dry, brown, and harvested. Levees green. Ditch banks mostly lined with trees and bushes.
River lined with strips of village, green with bamboo and trees – mangos, palms (areca, Cocos) – and bananas
Villages form patches and irregular strips of green.
~~Dry~~ Soil appears almost white where dry and bare.
Foothills to east are thinly wooded – crowns mostly not or scarcely touching, bare ground showing on south slopes. Forest gets thicker as mountains are higher.

330 m. 1100'

300 m 1000'

– sprouts from cut stumps, showing stipules. shrub, ripe fruit dark red, acid.

erect, ring of hairs at nodes ✱ perpendicular to stem.

Many trees yellow, many Melanorrhoea trees flowering, showing up white or pink. in first main range.
River plain narrow, in rice. Second range similar to first but somewhat higher. Much Melanorrhoea, and a considerable mixture of tree species evident. Here and in third range the forest is denser, crowns mostly touching, south slopes especially steeper ones, sparsely wooded with gray ground showing. Canopy generally very irregular, not complete. Much bamboo locally.
Foothills on other side sparsely wooded.

1957 Thailand

On east side of mountains an extensive mostly rolling plain, the flattest area ~~[illegible]~~ in rice, most of it in sparse wood, some of it young regrowth after cutting. Most of this forest rather an olive green. Along river a strip of cultivated village land, many bananas, then a beautiful dark green. East of river a broad strip of rice culture. Then a broad area of scrubby thicket and trees. More rice around Lampang. Then town with many trees - Banyans, tamarind

Rice fields with villages around air strip. Villages look like patches of bamboo and trees. Rice all harvested. Soil gray silt.

Southeast of Lampang desiccated paddy fields with termite mounds with trees. Then alternating with rolling areas of scrub, this sparse and with scattered trees.

Then a small range of hills with sparse forest with much bamboo, this

bamboo mostly dry.

The whole aspect here much drier than around Chiang Mai. After hills a rolling plain, mostly forested, some scrub, some rice cultivation. The trees in the wooded areas mostly leafless or becoming so. Some sharply outlined patches of dry bamboo on small hills. Forest woods in ravines, etc. green. Some hills still green. Eastward the relief is greater and the forest though sparse is definitely green.

Then a high double range of hills, well wooded and green, but with considerable bamboo. The forest on the higher parts of this has a complete closed canopy, but this of somewhat irregular height. Steeper south slopes have sparse woods with ground showing.

Then another flat to rolling valley bottom with a little rice, mostly forest, this very green but appearing rather degraded

with evidence of shifting agriculture. Fair sized river meandering through this valley. Rough land to east very well wooded and mostly green, some trees losing leaves. South slopes tending to be brownish. Some clearings, mostly overgrown. A few rice fields in flat places. Southward much more clearing, forest in more ragged condition. Then high hills thickly wooded but mostly with much bamboo. Some valleys with excellent forests. Along course considerable shifting cultivation but much less of it eastward. Cross valleys almost entirely in treeless condition much overgrown with weeds. Considerable population in these valleys. The forest on the higher hills is thick, but tendency to brownness suggests that it is deciduous. Southward the hills begin to flatten out and the forest becomes much more sparse. As land becomes flatter the proportion of cleared land increases. A road cuts

across here, following near the south base of the range of hills. Much rolling irregularly wooded land with some cultivation, fading into cultivated land and what appear to be several desiccating lake beds eastward. Southward fair area of some sort of dry land cultivation, also areas of pasture. The land along the course seems unsuitable for rice cultivation, too irregular to irrigate. Cultivation becomes more prevalent, forested land scarcer and ~~more~~ forests ~~so~~ sparser. A fair sized river to left, meandering. Some filled oxbow lakes, some ~~still~~ still with water. Much cultivated land, considerable sugar cane. Then more and more rice. Down the valley trees become scarce. Some rolling patches of sparse cultivation. Rice fields are getting ~~[illegible]~~ greener. Many scattered trees. ~~Many~~ Along river patches of village, a large boy with

a lake in center, Phragmites (?) around it, a sizeable bamboo forest.

The river is rather low with sloping banks cultivated during low water season, as at Chujeiro do Sul, Brazil. (Prob. tobacco). This at Pisnulok. Some lotus ponds here. Many coconut trees. Patches of ~~Sacharum spontaneum~~? abundant along air strip. Some Imperata.

Below town ground is flat, mostly cultivated but looks dry. Small ponds, ox bows, and parallel sloughs, mostly overgrown with floating vegetation. Irregularly scattered trees in cultivated and fallow land.

Some patches here are marshy, others seem a bit too high for cultivation at least of rice! Some small shallow lakes with patches of floating vegetation. Large Bananas patches. Considerable sugar cane near river.

The river is bordered by a thin strip of dark green village in the light olive green plain. Ox bows and old meanders

Cross river to east.

as well as marshy & inundated areas more prominent down river. Some rice cultivation around these marshes and some levees in the marshes. Villages scattered, connected in places by roads. Along these and along meandering channels villages tend to be continuous.

Down river trees tend to be absent from large areas of rice. Villages become scarcer. ~~Even~~ Even some channels have no trees.

Then very large areas of rice, with only small and widely scattered villages, trees very widely spaced, and numerous small circular & elongate ponds of all sizes, no outlets, often surrounded by a narrow belt of grass. To eastward trees become more and more abundant. Small tributaries of river meander almost like tidal channels. Very few roads in this area. Villages here almost treeless. General color brownish drab to green.

Again large marshy areas (east of river) and a

small isolated "island" hill of rock. A muddy lake near it with marsh and irregular patches of reeds(?) around it. Several other hills in distance. Inundated land along tributary of river. Some apparently flat land with ~~[illegible]~~ scrub and patches of dry bamboo.

Then a mosaic of cultivation, weedy ground, patches of wood and barren, scattered trees in open land. A belt of wood east of this, then east a cluster of brownish hills. Under course another such hill, mostly with bamboo, some woods. a large area of woods east of this, rather scrubby but not much disturbed, including a few more small hills, dry on south slopes; much cultivated land in small clearing southward along course. In distance a belt of clearing along a road.

Clusters of isolated small hills protruding up through alluvial plain become more numerous southward

Eastward is large wooded area, west of it much cleared pasture, immediately along course considerable rice, alternating with brushy patches, dryland cultivation, etc. The fairly extensive patch of abrupt hills mentioned above is surrounded by cleared land mostly brushy a pasture, some cultivation. These hills are probably sandstone (or granite?), rather reddish. Skirting south of them is a large canal. West and south of the canal is rice land with numerous trees (or termite mounds), these becoming sparser rapidly westward, many small ponds. This is just below Chainat. The rice fields here become definitely green instead of drab. Some inundated land or a small lake with ~~[illegible]~~ 41 small elliptical floating gardens of Ipomoea equatica (?) arranged in front of a small village. a considerable belt of very low land. West of it ~~[illegible]~~ strips of village with

some slightly higher ground with patches of sugar cane. The village more or less hidden by trees arranged roughly in a checkerboard pattern. The village strips mostly follow small canals or meandering channels.

Cross river again and follow it on west side. Rice land here without trees. Many old ox bows. East of river a large inundated area. Landscape ~~east of~~ on both sides of river marked by ~~those~~ meandering channels lined by village strips hidden by trees. Many irregular lakes or inundated areas surrounded by marsh and rice cultivation. Lopburi in distance. (Photos) More and more inundated land east of river. Rice here is partly green partly harvested and brown. Brassus locally abundant around villages

Crossed river to east. Broad areas of marshy land with abundant ponds

and channels on both side of river. Village strips here apparently on natural levees here, form a complex pattern just above Ayutheya. Below it is mostly continuous bright green rice with small scattered villages completely flooded. Water showing almost everywhere except on natural levees of river. Villages seem small here and widely scattered in proportion to area in rice.

To east a vast gridiron of tree-lined canals and intervening rice fields. This partly yellow, mostly green. Rice along canal bright green. Many Brassus, some truck gardens. near village and some on boundary levees between rice fields.

More and more truck gardens as Bangkok is approached. Villages become more numerous nearer Bangkok

1957 Thailand

Dec. 11 – Bangkok

39178 Hedyotis
weed in crevices of temple court

Dec. 12 - air trip Bangkok to Saigon, north side of plane
East of Bangkok the country is covered by a vast gridiron of canals. The ground is mostly covered by water, divided into a rather regular rectangular pattern of rice fields – these in every stage from open water to green to brown harvested fields. It is hard to tell if the ditches are for drainage or irrigation, but they serve for transportation. Their sides are almost continuous strips of village, marked by trees and bamboo. No roads at all. The gridiron is much finer, canals more numerous and closer together than on WAC chart. No trees here except along canals. Eastward more and more tidal channels between the canals.

39178a Bromeliaceae (pineapple family) (2) Vast. Dec. 6 Climbing Mass, maybe commercial

4 m.

erect, flowers white.

Eastward a higher proportion of the rice fields are brown and harvested, less regular pattern, villages along natural channels more than canals. Then a meandering river [illegible] trending about 60° back northwest from course. East of this the land is much drier and with scattered trees along course. Here are truck farms for a short distance east of river, recognized by close rows of earth banked up in patches. Then and to north, rice with few or no trees except along slightly entrenched meanders of tributaries of river. Irregular patches of slightly higher thinly wooded & brushy land. Rice land between these with scattered trees & termite patches. More and more wooded land, now densely wooded, some rather brushy. Rice cultivation

1957 Thailand - Cambodia

~~Dec 11 - Bangkok~~

disappears. Forest becomes continuous, then broken by strips and dendritic patterns of savanna. Then some low parallel ridges trending n.w.-s.e. The savanna then becomes less noticable and the forest assumes a reddish color, from flowering trees & perhaps beginning to lose leaves. Occasional large pale green trees. Some cleared ground. Then a rather abrupt small range of mountains, thoroughly forested except for grassy or brushy patches on south slopes and ridges.

Eastward a few very small hills and ridges, completely and densely wooded. Some small patches of decidedly reddish trees, general color dark green, eastward becoming decidedly reddish & brownish green. Stream courses more densely wooded and mottled green,

irregular strips of savanna between stream courses. Some hilly country, the sharper peaks rocky and with only brush. Hills become more numerous, green with brownish patches between them on relatively flat ground.

Then a disturbing sharp curved range of limestone hills with bare vertical cliffs and peaks (photo) East of this roughly parallel low ridges trending n.w.-s.e. Continuous dense forest Then level ground, forested but with a dendritic drainage pattern of strips of light colored brush & savanna trending eastward. Probably passing border of Indo-China (Cambodia) Some grassy clearings below course. In distance to north a large area of grass. The forest here tends to change to a mosaic of forest, scrub, woodland and savanna then more and more to savanna. Then a gen

1957 Cambodia

strip of bottom land smooth except with scattered trees, entrenched meanders of stream trending s.w.. Then more scrub and savanna with trees in varying proportions. Large grassland area to north then ~~some~~ a small rice area and a range of rough brown sparsely vegetated hills, then ~~another~~ several irregular clusters of such hills. Forest in valleys, ridges brown, scrubby. Forest and savanna south of these. Then large area of rice land with scattered trees a more likely termite mounds. These more numerous, then Battambang and a meandering river, more rice land and wooded stream bottom lands, then forming an irregular network. A large dark area, probably forest, far to north. Drainage trending northeastward into a forest area with some small patches of grass this changing to swamp

with low forest and emergent trees, conspicuous patches of light green grass some with ponds (To south of course cultivation and roads) especially in large green area to north. West end of Tonle Sap, to north, swamp with many small patches of open water, then meandering channels leading to lake, forest south of lake completely inundated (photo), trees with crowns sticking out of water. Along edges of lake a yellow-brown "bloom" as though straw were floating ~~on~~ and blown to south side of lake. Lake is a rather muddy color but not really very muddy.

North side of lake appears to be a very low wave-cut scarp. Back of this swamp and much open water. Perhaps the "scarp" is merely the abrupt edge of tall forest. Disappears eastward and north shore is inundated for a distance to a lake (Peam Bang). Lake becomes more muddy eastward, but with

a belt of clear dark water along north shore. The shore line west east of Pean Bang is very sharply defined, even though back of it is swampy and flooded land.

Lake very muddy at east end. Land around Phat Lan Day inundated, village either floating or on piling. Large expanse of water below this, some floating grass, trees with emerged crowns. A small village out in water, channels downstream marked by drying bars reddish mud flats. More inundated land, then dry land and cultivation south of sparsely vegetated mountain south of Chamrok village. This a large island surrounded by flooded land. East of this swamp with meandering tidal channels. Then light brownish green grassland ~~with~~ with some ponds and green meandering

lowland along stream course - soil light tan or beige color more and more cultivation southeastward. Many small ponds. Small meandering very muddy stream, dark brown grassland (?). many muddy ponds. A mosaic of large areas of this, with scattered trees, and light greenish tan cultivated areas - Krasan Lau, and vicinity. Then dry cultivated land with brushy low land along stream courses. Many fields outlined by hedgerows. Forest to north in distance. Lake inundates land with swamp and ~~swamp~~ savanna, patches of closely divided cultivated ground outlined by hedgerows - then large areas of a different type of cultivation, elongate fields. Swamp and flooded land back of a broad ~~to~~ natural plus levee cultivated and with a strip of village with trees, bordering the Mekong. Large sand bars, completely bare. Cultivation on east bank - broad natural

levee. Mekong stretches off to north; much braided (photo). To east a mosaic of swamp, open water, ~~bad~~ forest, and ~~F~~ cleared rice with levees. Large patch of uniform forest with geometrical boundaries; some areas in it cleared, dark green, probably replanted. Then large area of dark reddish brown marsh with muddy ponds and green gallery forest along meandering channels. Then more dry land in rice and wooded patches. ~~Then~~ Then rather sparse and ragged, some patches of marsh, patches of shifting agriculture and of open rice culture forming a mosaic. Some roads. Then large area of uneven woods, probably mostly secondary thicket, with small clearing or savanna patches, both dull brown and buff-brown. Brown over crisscrossed by trails. This continuous for some distance, with varied

amounts of cleared land, varied amounts of wood with large trees; a meandering stream. East of this a greater proportion of clearing and savanna and grassland. Then rather better forest with strips of clearing. (Probably crossed Viet Nam border.) Then mostly savanna with some cultivation, some patches of forest, especially to north. Then Mountain south of Khe Dol, north of Tay Ninh, a big town. The mountain covered by sparse brush - south of this is grass and cultivation, north of it wooded land.

Then a mosaic of varying cultivation, patches of forest plantation (or wild?) trees in rows, grass, rice, villages, etc. north of meandering river (Rach Cai Bad). Then mosaic of wet rice and dry areas of small fields and houses surrounded by hedgerows (photo). Rice

is green, higher land buff-drab with dark green hedge rows. Some low dark marsh areas in spots, many channels. This mosaic for some distance along north of river, large flooded areas and rice fields along river, considerable ~~mangrove~~ marsh-land, less rice, eastward. Riviere de Saigon in distance to north. More and more marsh and wet grassland as Saigon is approached. A large canal crossing area, as on VAC chart. Then higher land, cultivated in rice and in garden patches then surrounded by tall hedge rows. Many roads. This area intensively utilized.

Approaching airport areas of houses with hedgerows and many small elaborate cemeteries and striking temples, patches of planted woods.

Mimosa pudica very abundant along air strip.

Dec. 12 - air trip from Saigon to Clark Field, Philippines.

Intensively cultivated land, largely sugarcane, on both sides of Riviere de Saigon. Channels and ditches lined with trees. Away from river land is higher, cultivated, very pale soil, patches of forest and scrub. Small streams. Some eroded land with sparse scrub. Rolling land west of lower Dong Bi river (?) largely in scrub and scrub forest. Some cultivation, especially rice, on low spots. Last of river alternating areas of rice and dry land cultivation. Then an area of scrub or scrub forest with scattered emergent trees, then denser forest, then more scrub, a town along railroad. North of railroad a mosaic of forest, savanna and some cultivation, forest predominating, savanna and cultivation in broad strips with very irregular margins, the most prominent of these following Dong Nai River. Then solidly but poorly

wooded country. Visibility cut off by clouds. A few glimpses of forest through holes in clouds. A patch of reddish grassy or cultivated land with a town, then a mosaic of forest, savanna, and dry cultivation - soil red. To north mostly forest. Closer to course numerous small clearings and a large even planted forest, then dense natural forest with a small river, not very muddy, some small roads. Then patches of shifting cultivation in various stages of revegetation, fairly small bits of forest with large trees. Some irregular patches of grassland. A meandering river with very wooded bed, uneven degraded forest. Then large savanna with gallery forest along meandering stream, forest to south of it along course. Savanna extends to east, some ponds in it, a closely meandering stream with no gallery forest. Many circular ponds

and marshy spots. Some patches of forest. A range of hills and much forest to north of savanna eastward. Savanna more and more irregularly covered with trees, merging into forest ~~Then~~ in hilly country. Then much bright green savanna in hilly area. Some small streams, their courses locally wooded. The savanna merges with what appears to be sparse and irregular scrub ~~two dense scrub forest~~ Some very dry cleared patches. Range of ~~the~~ more prominent hills directly on course well forested, scrub on lower hills north of these clouds obscure visibility. Hills covered by rather sparse and irregular scrub forest, cleared along streams. Forest sparser eastward, some bright green grass (burnt?) to northward on hilly mixed with forest. Eastward forest is sparser and more irregular, reddish ground showing on low

ridges, clearing only
near stream courses.
Changes to savanna
Clouds obscure visibility.
Irregular mosaic of
savanna with some
forest and woodland,
some spots badly eroded,
cattle trails a very many
roads here and there. Terrain
becomes more hilly and the
wood more dense, though
still generally sparse
enough so the reddish
ground show through
in many places. Some
patches of savanna on
high ridges and slopes,
hills higher now, slopes
mostly wooded. Scattered
clearings and former clearings.
Then badly eroded low
rolling country, mostly
irregularly spinely wooded.
Then more irregularly wooded
hills, with woodland,
dense scrub-forest, and patches
of savanna. More lower
hilly eroded country
with irregular woodland,
ravine wooded, hills
savanna & woodland,
changing eastward to
savanna with gallery

forest along stream courses.
Then green flat sea
land fingering into
hilly country from
broad flat land, this
somewhat to north,
along course sparse scrub
& woodland & alluvial
fans at ~~one~~ of poorly
wooded rocky hills on
course. To north green,
reaver ridges, then red
cultivated land with
areas of red sand dune.
Then broad sand flats
with little vegetation
along shore of China Sea.
Small estuary seaward
of green sea-land ~~for~~ a
little north of town ~~east~~
turns inequilarly eastward
along coast. Large mountain
mass just back of
narrow ~~estuaries~~ coastal plain,
where coast turns north
again. Ridges grassy, ravine
wooded. Coast to north
very irregular. Beaches
tan color. Some bright orange
red ~~clay~~ eroded & sandy
areas on very irregular
peninsula, far to north.
& island
Then open sea.

1957 Philippines

Dec. 14 - Das Mariñas, Cavite
Air deposited tuff - rather friable, coarse to fine grained. Hard fragments to 1 cm. ± max. covered by a thin soil, dark gray, very sticky clay, during dry season extremely hard and tough, cracking into blocks. not more than 1 - ½ dm ± thick. Used for rice only. Workable only in wet season. This tuff called "adobe stone" in higher land ~~and~~ is subaerially deposited, in lower areas waterlaid, here much harder. Tertiary in age, supposedly from Taal Volcano.

Dec. 14 Tagaytay
greenish tuff deposited in successive eruptions, with thin buried soil layers, also round nodules in these layers. Overlain by a profile about 1 m. deep. the top half a black blocky clay, hard and tough but not unworkable below this a dark reddish brown gradually changing to unweathered tuff boundaries not at all sharp between layers.

Lake's "loam"

Silang

Dec. 14 - Taal Volcano -
a huge caldera with outer slopes very gently dipping. Inner slopes sharply eroded in very steep fashion. The ash and tuff on outer slopes regarded as tertiary.

Dec. 14 - Between Tagaytay and Manila the soil is all derived from the ejecta "adobe stone" from ancient Taal Volcano. For about 30 km. from Manila the ash and ♦ lapilli were laid down in water and are consolidated and impervious. The soil is shallow, is waterlogged the greater part of the year, very desiccated the other part. It is suitable for wet rice cultivation but scarcely supports ± ces. The landscape is open with bamboo and some trees around villages, also where there is rough ground. From 3 km. on the general land surface

1957 Philippine

rises gently, with a rolling topography, to the caldera rim. In this part the pyroclastic material and ash were deposited ~~and~~ subaerially. The consolidation is not so complete and the ~~so~~ material not so impervious. The general profile is that of the black soil described on bottom part of p. 94. Where this has not been seriously eroded the surface soil, where worked, is black. Where eroded it is mod red-brown, lighter where badly eroded.

Dec. 14 - Silang, south of Manila, Cavite Province.

39179 Psychotria
1 in secondary thickets

The area of ~~the~~ waterlaid tuffs may well never have been forested though this is impossible to determine now. The higher ground was doubtless well wooded but nothing remains of this now. The landscape is now a man-made one. Sugar, rice, and perhaps some other field crops are common. Large areas are in coconut plantations. Mango, Chrysophyllum, Areca, Sandoricum, Psidium guayava, Annona spp., Citrus, are generally abundant with no obvious regular arrangement, especially around houses. Papayas are scattered as well as in small plantations. Papayas and pineapples are in places planted together. Coffee plantations are shaded by Glincidia.

shrub, fruit orange, fleshy, possibly slightly immature.

1957 Philippine Is - Mariana

Dec. 15 - Clark Field, Luzon

39180 Ficus
" street tree

3 81 Polyscias
common ornamental shrub

+ 82 Tremna
occasional on golf course

3 83 Ficus
occasional on golf course

1 84 Artocarpus
occasional on golf course

Dec. 16 - Cocos Island, Guam

3 85 Lepturus repens
common open ~~rocky~~ gravelly area, washed over by salt water during typhoon.

Dec. 17 - Agaña, Guam

3 86 Ficus pumila L.
creeping on old Spanish bridge

small tree, dissected leaves from sprouts from cut stub; figs immature.

sterile shrub 1 m. tall.

tree 15 m. tall, trunk 20 cm dbh; leaves green beneath; fruits blackish.

small tree, cauliflorous.

tree 20 m tall; sterile.

2 m tufts, sending out runners.

4 m creeper, orange; grandes tightly adherent to stone. those with large leaves erect; no fruit seen.

1957 Juan

Dec. 16 - Cocos Island -
Effects of typhoon
of Nov. 14

Acc. Coast Guard personnel
wind came first from
N.E. then S.E.

Waves came over west tip
of island from sea side
and even well eastward
up to top of high ground.
Here are deposits of fresh
coral material up in
the Scaevola which is
badly battered but
not dead along top of
beach. Material carried
up is coarse up to boulders
3-5 dm. across.

Casuarina lies dead on
seaward slope, drowned
on seaward side of thicket
on high ground.

Seaward part of reef
platform swept clean.

Waves from lagoon deposited
much sand and some
cobbles and boulders on
grounds of coast guard
station. Lawn of Cynodon
killed where covered by
any amount of salt water.

Portulaca oleracea and
Cyperus rotundus showing
fast recovery.

Trunks of even the deadest
looking Casuarina are
sending out tiny green
sprouts. Branches dead
& apparently so.

Along inner beach on
large crescent there
seems to have been
deposition toward the
horns, and removal
of at least a dm. or so
on the deep part of the
concavity, exposing
the upper parts of the
root systems of Casuarina
trees and other shrubs.

Along the beach east
of this there seems to
have been excavation
in the concavities and
deposition back of the
cusps.

In the interior from
the inner beach
there is a great tangle
of branches, trunks
and rubbish. Most
of the plants seem to
have suffered very
much, except Casuarina
which is very brown
in most places. In
some places heavily
and Tournefortia are badly

battered and almost leafless. Only where plants are actually uprooted are they completely killed.

In the place where the 1949 typhoon crossed across the island this one said by the coast guard men to have cut in much farther. This appears to have been from the lagoon side, but not really very much, as the rocks in the inner bare part are still bleached by algae. Perhaps material may have been removed from the ~~lagoon~~ 100 m. or so. Reyes confirms this.

Plants observed:

Casuarina equisetifolia
Scaevola sericea
Tournefortia argentea
Cordia subcordata
Clerodendrum inermis
Thuarea involuta
Euphorbia chamissonis
Euphorbia hirta
Cenchrus echinatus
Lepturus repens

Ipomoea pes-caprae
Thespesia populnea
Portulaca oleracea
Cyperus rotundus
Cynodon dactylon
Remphis acidula (only on exposed rough limestone).

The Cynodon lawn is pretty well killed out in the spots where salt water stood & green on higher ground except where swept by waves from seaward. But even in low places are green patches. Possibly none of the grass is really killed.

Where the roots of Casuarina, Scaevola, Tournefortia, etc. are partly exposed the plant is generally in bad shape. But none of the plants listed seemed really killed except when uprooted.

1957 Marianas Is.

Dec. 16 - East from Inarajan around to Merizo - Trees show much browning, much breaking of branches and some of trunks, a few trees uprooted. In general not as much defoliation as ~~after~~ 3 months after typhoon Ellyn. Few places show any washing away of soil or conspicuous effects of flooding by sea water. Perhaps more debris washed & blown into thickets than in 1950. Mangroves at Merizo scarcely affected. Nipa at Inarajan and elsewhere browned somewhat but not broken. Leucaena bedraggled looking but not killed. Artocarpus with leaves mostly browned where hit by spray, but recovering.

Dec. 17 - Kotod, in Naval Magazine Area.

grassy slopes, some areas with Miscanthus, ~~mostly~~ mostly without Miscanthus but with Paspalum, Fimbristylis, Chrysopogon, Stachytarpheta, Hyptis capitata, Sclerias and other weedy herbs, abundant thickets of Cestrum, Triphasia, Psidium, Glochidion, Hibiscus tiliaceus, Pandanus. Scattered trees of Pimenta, some coconuts and mangoes, bamboo, Casuarina, etc.

Soil on slope is odd - a stiff, black clay about ~~20~~ 15-20 cm. or more thick, blocky when drying, over a yellow-brown or yellow ochre clay, also stiff and plastic, but crumby when drying. The surface black layer is crumby ~~when dry~~ on the surface when very dry.

This area belonged to the Agricultural Experiment Station before the war. Cattle were grazed here. Experimental grass plots nearby.

1957 Marianas Is.

Dec. 17 - Kotora, heads. of Maemong R. of Cross Island Road, ~~south~~ ~~of Hum~~ s.e. of Finatayi, ~~east of Finatayi~~ secondary thickets and weedy slopes, disturbed area

39187		Tarenna sambucina
4		occasional
2	88	Pimenta ~~acris~~ racemosa
		common, scattered trees, ~~tree~~ said to have been introduced before the war.
2	89	Glochidion
		occasional
3	90	Glochidion marianum
		common
4	91	Scleria
		locally abundant, gregarious.
3	92	(Cyperus)
		local under mango trees
4	93	Scleria
		on bare soil
1	94	Hedyotis biflora (L.) Lam.
		~~on~~ vegetal, on bare soil
2	95	Phyllanthus ~~simplex~~ virgatus
		occasional
2	96	Kyllis capitata
		abundant
3	97	Fimbristylis annua
		common

100 m. shrub ~~2.5~~ 3 m. tall; fruit immature.

↓ — small tree, 4 m. tall, strongly aromatic when broken; sterile.

shrub 1.5 m. tall, leaves glaucous when young.

— flowers yellow.

shrub 2 m. tall, leaves glaucous beneath when young; flowers yellow.

— erect, 1 m. tall.

prostrate, flowers purple.

flowers lavender.

Fruit 7.
75 m. ↓ spreading branches.

erect, aromatic, flowers white. "buttons" cut stubs said to cause seriously poisoned wounds, sometimes fatal.

39198 (grass)
2 common on bare soil

99 (grass)
occasional

200 (alga)
parasitic on Alocasia

Plants seen in brushy pasture, Kotod:
Urena lobata
Stachytarpheta indica
Desmodium triflorum
Cestrum diurnum
Sida acuta
Merremia hederacea
Ageratum conyzoides
Morinda citrifolia
Psidium guajava
Triphasia trifolia
Pimenta acris
Glochidion marianum
Nephrolepis hirsutula
Hyptis capitata
Paspalum orbiculare
Paspalum dilatatum
Paspalum conjugatum
Chrysopogon aciculatus
Heliotropium ovalifolium
Centella asiatica
Cassia sophora
Emilia javanica
Cananga odorata
Elephantopus mollis
Fimbristylis annua
Hibiscus tiliaceus

50 m spreading

Scleria sp.
Scaevola sericea
Pandanus tectorius
Tarenna sambucina
Phyllanthus amarus
Cassytha filiformis
Scleria sp.
Bambusa vulgaris
Mangifera indica
Curcuma domestica
Vernonia cinerea
Leguma
Chloris radiata
Casuarina equisetifolia
Pseudelephantopus spicatus
Corchorus acutangulus
Dimeria chloridiformis
Mitracarpum
Hedyotis biflora
Malvastrum coromandelianum
Flagellaria indica
Polypodium scolopendria
Pycnosia
Davallia solida } on mango
Ipomoea pes-caprae
Hyptis suaveolens
Zingiber zerumbet
Fimbristylis dichotoma
F. miliacea
Phyllanthus simplex
Waltheria indica.

Dec. 18 – south boundary of Anderson 97B.
bearing of boundary 70° w. of n.

Forest on fore slope at top of cliff – low, scrubby, at most 10 m. tall, trees to 2 dm dbh. mostly Macaranga, Ficus, Ochrocarpus, Guettarda, Heritiera longipetiolata Understory of Cycas, Guamia, Aglaia, Ixora tinctoria, Psychotria mariana, Triphasia, Morinda citrifolia, Cynometra, such vines as Morinda umbellata.

epiphytes – Polypodium ~~truncatum~~ pectinatum
Pyrrosia, Davallia
on rocks Asplenium ~~caudatum~~ falcatum

Monument at edge of Anderson 97B on top ridge of rampart. Measured 560 ft. inland 70° w. of n. from monument.
Here is dense tangled thicket of Ochrocarpus, Aglaia, Ochrosia, Macaranga, Cynometra, Guamia, Morinda, Piptrurus, Pandanus tectorius, some Ficus. Cycas. much Piper

in undergrowth. This thicket is dense but very irregular, occasional hardly dead larger trees sticking out of top as emergents.

The land of Anderson 97B up to the boundary of the private land to the south has been bulldozed clean of vegetation, soil and all.

1957 Marianas

Dec. 18 - north end of Anao ~~Mati~~ Conservation ~~Reserve~~, just south of Anderson Air Force Base. in scrubby forest on thin soil on limestone

39701 5		Stenotaphrum micranthum common in small semi-open spots	160 m.	prostrate
10	02	Heritiera longipetiolata Kaneh. very local on slope above top of cliff	170 m. ↓	tree (15) ~~15~~ m. tall, 3 dm. dbh, strongly buttressed; flowers greenish. semicaudent shrub flowers white 4-5 parted; fruit immature.
1	03	Maytenus occasional in forest		

Y-Piga

Dec. 19 - ~~Dugdog~~ Conservation ~~Reserve~~, n. w. of Yigo in Wet forest, mainly Pandanus, on limestone. 160 m. ↓

5	04	Asplenium caudatum epiphytic on small sapling	frond curled from dryness when collected.
1	05	Asplenium epiphytic on tree trunks.	— fronds limp and wilted from dryness when collected.
1	06	Antrophyum reticulatum epiphytic on tree trunk	
4	07	Ophioglossum pendulum rare, epiphytic on tree trunk	fronds thin, not very firm, hanging vertically; roots forming large mass.
4	08	Trichomanes seen on one tree trunk	— forming a mat, fronds curled from dryness.
5	09	~~Cyp~~ (bryophyte) epiphytic on Eugenia reinwardtiana	

(Ctd. on p. 116)

7-Pigs

Dec. 19 - Degraded conservation Zone 7 Pigs

Thick degraded forest trees mostly 5-10 cm. dbh about 6 m. tall spaced 2-5 m. apart, mostly
Pandanus tectorius
Premna obtusifolia
Aglaia
Ochrosia oppositifolia
Hibiscus tiliaceus
Maytenus
Guamia n. Pangium club
ground cover sparse, mainly small Nephrolepis biserratus.

Epiphytic ferns - Belvisia, Davallia solida Polypodium ~~pinnatum~~, Asplenium nidus, Vittaria, Pyrrosia, common. Epiphytic hepatics abundant on trunks + branches, epiphyllous at least on Triphasia + Maytenus leaves. Some epiphytic orchids. Freycinetia common climbing on trees.
Shrub layer of Piper, Discocalyx, seedlings of Maytenus

Polypodium scolopendria

At 87

1957 Marianas

(cont'd from pp. 112-113)

160 m.

↓

39210			
2		epiphytic on Triphasia trifolia	
2	11	epiphytic on Guamia	
5	12	epiphytic on stilt roots of Pandanus tectorius	
2	13		thin, not forming cushions
2	14	epiphytic on trunks of small tree	
3	15	epiphytic on small branch	
3	16	epiphyllous on Morinda umbellata	
3	17	epiphyllous on Flagellaria	
3	18	epiphyllous on Aglaia	
	19	epiphyllous on Freycinetia	
4	20	epiphyllous on Discocalyx	
2	21	epiphytic on Guamia	
2	22	epaphyllous on Asplenium nidus	
	23	epiphyllous on Davallia solida	
2		epiphyllous on Polypodium scolopendria	
2	24	epiphyllous on Polypodium sp.	
2	25	epaphyllous on Peperomia pellucens	

1957 Marianas

Guam

39226

2 epiphyllous on Nephrolepis

2 27 epiphyllous on Maytenus

2 28 epiphyllous on Ochrosia oppositifolia

2 29 epiphyllous on Triphasia

1 30 ~~Ochrosia~~ (subst.) epiphytic on Artocarpus

leaves not strictly distichous; more or less irregularly arranged.

3 31 Thuidium on coral limestone cobble

Dec. 20 - Anao - Mata Conservation Reserve -

Looking down on vegetation on terrace below there is very little evidence of typhoon damage

Edge of cliff - wind-sheared low bush, locally at least over 50% Triphasia, but with Maytenus, Canthium, Psychotria mariana, Ficus prolixa, F. tinctoria, Allophylus, Ochrocarpos, Cycas, Premna, Jasminum guamia,

Transect 2, appx. north just inside boundary, 100', through a very scrubby thicket-like forest with few trees above 8 m. tall and 1 dm. thick, some scattered large ones, as emergents, but these have suffered much from typhoon. Most abundant small trees are Ochrosia, Triphasia, Ochrocarpos, Cycas. Larger trees seen are Guettarda, Premna, Ficus prolixa, Pouteria, Pandanus tectorius, Ochrosia

Bare rough limestone at top of cliff has Fleurya ruderalis (both green and red), Portulaca oleracea, Eragrostis ciliaris, Lepturus repens, Wedelia biflora var. canescens, Hedyotis foetida var. mariannensis, Achyranthes, etc. Phyllanthus mariannus

With scrub Polypodium scolopendria, Peperomia, Procris, Blechnum, Epiphytic here lichens, Taeniophyllum

Epiphytes very few -
Pyrrosia, Polypodium sp.? Davallia
Polypodium ~~subauriculatum~~, bryophytes,
but not abundant, more on fallen logs
Shrubs not recorded in
transect but present -
Maytenus, Hibiscus tiliaceus
Bleeheria, Triphasia, Piper.
Macaranga (rare)
Vines - Alyxia, Jasminum,
Morinda umbellata,

Cycas shows effects of
drought & of typhoon +
Old leaves dried & abscised,
on many plants have
all been shed. New primordia
are growing upright a dm or
so high. Cut trunks tend to send
up aerial branches.
Seedlings of Aglaia, Cycas,
Ochrocarpus, Guamia,
Morinda citrifolia, Triphasia,
Jasminum common
Pandanus, ~~Leaphassia~~, Cynometra
Ochrosia less common.

Small clearing on trail
just inside boundary
Thar Sporobolus elongatus
Stachytarpheta indica,
Leptaena reptans common.
One plant of Bidens, two or
Centrum, several Leucaena. Transect
#2 runs north from this clearing.

at top of cliff just south
of top of trail made Transect
3, in low forest about
4-5 m. tall, closed, mixed,
Triphasia most abundant.
slope gentle, steeper
toward top, average 8° slope,
rough limestone with
very little soil. No
obvious signs of typhoon
damage here.

Back from the ridge of
which the above is the fore-slope
is a depression in which
the forest is much more
luxuriant than on the
flat limestone farther
inland. This broad
trough apparently runs
parallel to the cliff, but
there is no indication
whether or not it runs
the whole length of the
reserve.

(On Dec. 28 this clearing had been
lightly burned, the fire
running somewhat into the
woods, affecting the near
end of the transect.)

1957 Marianas

Dec. 20 - Anao ~~Conservation~~ Mati Reserve

~~incessantly~~ in scrubby forest

3 9 2 3 2 4		Cyperus dactylingia? local in trail	1.60 m. ↓ heads white
4	33	Ficus prolixa? just back from top of cliff	banyan type tree, low, widely spreading; fruit immature (very large for F. prolixa)
6	34	Psychotria ~~sodoepiana~~ Hem. rare	shrub 1.5' m. tall, fruit immature.
1	35	Fleurya ruderalis on ~~rock~~ pitted limestone at cliff edge in full sun	stems and inflorescences fleshy, green to red.
2	36	Eragrostis ciliaris on pitted limestone at cliff edge in full sun.	
4	37	Canthium odoratum var. tinianense in scrub on edge of limestone cliff.	
2	38	Usnea on stems of Triphasia on exposed cliff edge	

Dec. 21 - Apra Heights. Cross Island Road

Patch of Casuarina up to 8-10 m. tall, 15 cm. dbh. growing in area of Dimeria on gentle slope. Shading out the Dimeria but under it are ~~bea~~ flourishing Cerbera, Scaevola, Myrtella, Wikstroemia,

Melastoma, Morinda, Timonius, Geniostoma Decaspermum, Phyllanthus saffordii, Pandanus tectorius, saw herb.

The blanket of needles may have an adverse effect on the Dimeria as well as the shade. Trees spaced about 2 m. or more but smaller where crowded.

Dec. 21 - Cotal Conservation Reserve, Cross Island Road

Mosaic of Dimeria and Miscanthus types, with much Casuarina of all sizes up to 5-6 m. a more on flat high ground. In Dimeria area are patches and spots of bare ground a very sparse vegetation. These are washed out and wind scoured strips. In many places are well developed erosion scar assemblages of plants. In some spots Chrysopogon rhizomes have been buried by deposited soil to several cm. Their shoots are appearing in profusion at the surface.

Miscanthus seems to be invading the Dimeria here, but this should be checked very carefully. Transects 4 & 5 are on flat ground with a good diversity of vegetation. In eroded places are exposed various mycorrhizae - apparently on Casuarina roots (but perhaps on Myrtella). These should be investigated. Collection made

Dec. 22 - Cotal Conservation Reserve

Flat top of mesita, not an original surface, perhaps, at least at somewhat lower elevation than nearby ridge.

Mosaic of Dimeria and Miscanthus grasslands. Casuarina seedlings locally abundant in Dimeria type. Many areas have been eroded and are dominated either by Stachytarpheta or Chrysopogon.

Erosion and deposition cycle tends to maintain the flat surface of these mesitas, as the clay is deposited in the depressions. Possibly there could be considerable degradation without destroying the flat character of the surface. The occurrence of slightly raised ground toward the edge is puzzling. This is evident only in some spots. Well grown Casuarina trees are more common along the edges of the mesitas than generally.

1957 Marianas

Yona

Dec. 21 - south of Yona — 70 m.

39239 Paspalum fimbriatum roadside

1 1 am.

Dec. 21 Back of Yig on Cross Island Road — 90 m.

1 40 Sorghum abundant along road — from thick rhizomes.

Dec. 21 - Cross Island Road just east of Afra Heights — 100 m.

4 41 Machaerina mezenii in Casuarina savanna — dense patches

Dec. 22 - Mt. Tenjo - top is densely overgrown with Miscanthus with scattered Leucaena. West side, at end of road is very densely covered by Leucaena. East shoulder with more or less flat top is largely covered by Dimeria with sparse Casuarina, considerable erosion from scars started by Military activity. Steep slopes densely covered by Miscanthus

East slopes' main top with one or two Casuarina trees and dense growth of Leucaena

guam

from thick rhizomes.

dense patches

Dec. 22 - Ritidian Point - Looking down from top of cliff reveals very little obvious typhoon damage, though Mr. Fleming says the breadfruit trees in the coconut plantation have suffered severe damage.

Pluchea odorata is still persistent around lighthouse area, though not common. Also seen a half km. or more down the road from the point.

Variation in Ficus prolixa is not at all simple. Some have very large speckled fruit, others small, not speckled. Some have slender twigs.

Dec. 22 - Mt. Tenjo. 280 m.

39242 Miscanthus floridulus
Dominant on steep slopes

cane 2 m. tall, this the only fruiting culm seen.

Dec. 22 - Nimitz Hill, top of ~~Spruance~~ Drive. 150 m.

43 Crotalaria retusa L
common in roadside ditch

~~stems~~ herb up to 0.8 m. tall, flowers yellow.

Dec. 22 - Cotal Conservation area, Cross Island Road in ~~Bimeria~~ grassland on flat top of ~~breccia~~ on red clay soil 150 m.

44 Euphorbia
rare

erect, gland appendage white.

45 Ipomoea littoralis Bl.
common locally

prostrate creeper, flowers purple, stigma white, bicapitate.

Dec. 22 - Ritidian Point in scrub at top of cliff 170 m.

46 Ficus prolixa var.

shrub 3 m. tall, ludifera, figs almost ripe, purplish white to green, speckled, receptacle

47 Eugenia bryanii

shrub 1 m. tall, sterile. (type locality)

48 Ficus prolixa var

small tree, more or less weeping habit, figs immature

49 Ficus prolixa var.

small tree, figs immature.

50 (fern)

Dec. 23 - Agana Swamp 2 m.

51 ~~Stoea~~ (Eupatorium?)
roadside, edge of swamp

vine, flowers purplish

Dec. 23 - north end of Harmon Field

3	52	Melochia common in secondary scrub on limestone	85 m.	shrub 2 m. tall. leaves grayish, flowers ~~red~~ pink, in center, solitary distally.

Dec. 23 - northwest corner of Y-Piga excavation Reserve dense tangled moist forest

4	53	Ficus prolixa occasional	160 m. ↓	banyan type tree (fallen but still alive) fruits on twigs and in clusters on main stems.
2	54	(Lupatis) epiphytic on banyan		
2	55	(nov.) epiphytic on banyan		
3	56	Vittaria common on tree trunks		pendent
2	57	Asplenium caudatum occasional epiphytic on tree trunk		
4	58	Asplenium laserpitiifolium rare on tree trunks		pendent
4	59	Belvisia mucronata very common on tree trunks		

Dec. 24 south side Y-Piga Conservation reserve. Thick moist forest

			160 m. ↓	
4	60	(Orchid) common, epiphytic		leaves fleshy, not clearly distichous; flowers greenish white
2	61	(moss) on tree trunks		

1957 Marianas

Dec. 24 - back of agriculture Demonstration Farm, 1 km. n. of Yigo
Thick forest on thin rocky soil

39 x 62 (orchid)
occasional, epiphytic

1 63 (orchid)
rare epiphytic
- 64 Ixora Triantha Volk.
occasional

155 m
↓

leaves fleshy, not strictly distichous; flowers greenish.

tree-like shrub 3 m. tall; flower buds greenish white.

Dec. 24 - Bad of Agriculture
Degumitation Farm Yigo
Trees in det forest as
everything soil on ~~lime~~
rough limestone
Osmoxia opposatifolia
Pemma obtusifolia
Ficus prolixa
Claoxylon marianneuse
Aglaia marianneuse
Pandanus tectorius
Morinda citrifolia
Guamia marianneuse
Artocarpus marianneuse
Hibiscus liliaceus
Triphasia trifolia
Melanolepis multiglandulosa
Guettarda speciosa
Intsia bijuga
Canangia odorata
Ixora triantha
Maytenus Thompsonii
Pandanus dubius
Elaeocarpus joga

Dec. 25 - Top of cliffs just north of Achao Pt. - cliffs here are of very rough limestone, not quite vertical, densely wooded.

At top are Triphasia, Premna, Rapanea, aglaia, Pandanus tectorius, Guettarda, Morinda citrifolia, Eugenia reinwardtiana (only small ones seen), Cycas, Guamia, Melanolepis, Dictyoloma, Ficus prolixa (dead or fallen trees only seen), Pipturus (seedling), Ixora triantha, Carica (in opening). Below, perhaps 25 m. down is a large Artocarpus marianensis with entire leave. Ficus common down a bit.

On rough limestone of cliff Asplenium falcatum is very common, also Pectaria crenata. Epiphytes Pyrrosia, Davallia, Polypodium linguiforme, Pendrobium (?) are common but not abundant. Mosses and hepatics common on trees and rocks, but not in profusion. Balanophora on ledges, on roots of Premna (or perhaps Triphasia)

On the flat at top of cliff is old cleared land now a savanna of Pennisetum setosum and small Pipturus, Premna and Triphasia, with thickets of Triphasia with some Pandanus tectorius, and Bleekeria, Achrosia, Clerodendrum inerme, etc. Back of this is an abandoned coconut plantation

Dec. 25 - Ritidian Point, top of cliff.

Looking down with binoculars it is not possible to see much effect from typhoon. One or two trees broken a bit down on lowest terrace, some bare branches, possibly from this typhoon or others. Four cleared terraces visible, incl. the plateau. East of point is plateau, is a fine stretch of forest, very even, with few dead trees, quite a variety of species. From within this forest is rather scrubby and disturbed. Aglaia, Ficus prolixa, Guamia are most abundant, Macaranga, Claoxylon, Pisonia, Guettarda, Ficus sp. Premna

Heritiera, Periantheæ, etc.
– rare Wikstroemia
locally common
Trees generally about
8-10 or less m. tall. few
over 2 dm dbh. except
Ficus, Pisonia, etc.

Dec. 25 – Ritidian Point
in rather scrubby forest on
very rough limestone

39 x 65 Hedyotis corymbosa
2 in open hard ground of road
7 " Wikstroemia
locally common in shade
and in small openings
3 67 Wikstroemia

8 68 Heritiera longipetiolata Kaneh.
very rare two old trees seen
15 69 Periantheæ nelsonii Merr.
very rare, no tree seen

Dec. 25 south west corner of
Northwest Field, south of
Ritidian Point
4 70 Erigeron annuus L.
common locally

Dec. 25 – north cliffs of ~~Archaeological~~ Pt.
~~4~~ south of Ritidian Point.
3 71 Balanophora
occasional on ledges of rough
limestone

165 m. flowers white.

shrub 2.5 m. tall with
long pendent branchlets;
– flowers greenish yellow;
sterile plant with
– larger leaves.
– Tree 14 m. tall, 2.5 dm. dbh.

tree 12 m. tall, flat topped,
with brownish green cast; flowers
with corolla greenish white,
stamens crimson.

150 m.

erect; rays white.

150 m.

flowers deep salmon, wood rose
on Premna obtusifolia (or possibly
x Triphasia trifolia).

Dec. 25 - about 1 mi. s. of Potts Junction on bare coral roadside

39272		Dentella repens common.		prostrate; flower white, lobes toothed; fruit immature.
3	73	~~Dendroseris~~ Conyza canadensis abundant		erect, rays white.

Dec. 25 - top of cliffs at Mabo south of Edmparaya Point 135 m.

5	74	Desmanthus virgatus rare in thin brush of Leucaena, etc.		shrub 2 m. tall; flowers white.

Dec. 27 - B beach east of Marigo 1 m.

4	75	Hybocarpus moluccanus (Lam) single tree in open area just back of top of beach.	N. Roem.	tree 5 m. tall, flowers white.

Dec. 27 - Agfayan Bay 2 m.

3	76	Heritiera littoralis single tree near shore		tree 8 m. tall, sterile.

1957 Marianas Is.

Dec. 27 - Mt. Schroeder

Fire reported yesterday on south slope. Today when examined almost the entire south slope except the forested areas had burned. Several small area of green grass still remain just below the main ridge. Fire still burning downward on southeast spur below the steepest part. On north side one very steep slope has burned and several small lobes east of this. Cannot see how far down on northeast side. Apparently the fire did not enter the wooded areas. Examined only from Meriyo Annex through binoculars. Grass is burned clean in some areas, in others apparently leaves burned off, leaving canes. in several areas it did not burn at all.

General notes - Typhoon Cola defoliated most trees south of north end of NAS Agana. Largely leafed out again by now. Many trees blown down in most parts of island, even in protected places. Several trees seen with trunks snapped off 2-3 m. from ground. Branches broken in large number. Artocarpus seems to be the most frequently damaged. Though Ficus prolixa is blown over to some extent. Mangroves at Merizo not injured visibly, nor Nipa at Inarajan.

Bidens pilosa var. radiata has spread over the entire northern half of the island, is locally abundant and very hard to control.

Wild Carica papaya is still fairly common but was nowhere seen in any abundance.

Trees blown over by typhoon have spreading but very shallow root systems not penetrating limestone significantly.

1957 Marshall Is.

Kwajalein

Dec. 28 - Kwajalein I. Naval air station

39277 Chrysopogon aciculatus large patch in lawn, somewhat protected and semi-shaded — 2 m. ↓ prostrate, forming a tight mat, fruiting culms ascending to erect.

1 79 Caesalpinia major (Medic.) Dandy & Exell? solitary individual at top of beach in full sun

Erosion ramp near terminal very low, pitted with ~~pots~~ small potholes which tend to be in rows perpendicular to beach, thus tending to coalesce into grooves. Lawn near terminal is a mixture of Dactyloctenium Desmodium canum, Fimbristylis cymosa, Leptochloa, Thuarea, Vernonia cinerea, Eragrostis amabilis, Phyllanthus amarus, Chrysopogon, Euphorbia prostrata Euphorbia thymifolia, Cenchrus echinatus, Heliotropium ovalifolium, Lygodesmia, Stachytarpheta indica, the last three uncommon. Paspalum vaginatum common near beach.

1958 Hawaiian Is.

Jan. 3 - Air trip Hickam to Hils

Ridges above ~~Nana~~ Moana Lua ~~Hal~~ and dieq are badly eroded ~~on~~ on their tops just below crest edge. South end of Waianae Range likewise. Large bare areas lacking any significant vegetation. Slight traces of same sort of erosion on ridges of s.e. Oahu, but this seems much less obvious than 20 years ago.

West Molokai seems to be greener than usual, bare red earth only extensive in interior of west end.

Even Lanai is much greener than usual, but still large bare red scars on top of west end and some on ~~south~~ slopes. Striking perpendicular wave-cut cliffs on south side of west part, with cusps and coves. Erosion scars on north part of plateau west of mountain. Top of mountain hidden by clouds.

Northeast slopes very seriously eroding in upper parts, lower parts grassy with clumps of & patches some ~~Kiawe~~ Prosopis, this forms

a dense strip just back of shore all along with red edge of forest on top of mountain just showing below clouds. Erosion on north side looks worse than 20 years ago.

Slopes of Kahoolawe have Prosopis and Opuntia scrub and grass. Top largely bare and bright red. Small area of grass. a small shallow well-formed crater on highest peak on north side.

Many craters along s.w. ridge of Haleakala. Scattered over low down on ~~s.~~ e. side. Flow patterns very obvious on this slope except near top of ridge. Dissection increases northeastward. S.w. end is dry, vegetation thin especially near top of ridge. Becomes more green northeastward to Kaupo Gap, which is wooded. Beyond this the slopes are densely forested. Sea cliffs bare. In Kaupo Gap there appears to be a belt of alauiites about 1/3 the way up. Some alauiites northwest of this but at lower altitudes, in gulches. Some bare grassy lower slopes between Kaupo Gap and

Hana, probably cleared for pasture. The pale green patch in Kaupo gap could be grass, not clearly discernible as distance is too great for clear view.

In Hawaii along Kohala coast large areas of sugar cane on north and northeast slopes, some conspicuous grassy areas below forest and above cane, also on first ridges between gulches. Forest on plateau looks in bad condition in some areas toward north, tall trees few. Not so southward. Much clearing at upper middle altitudes or valley walls.

Along Hamakua coast is a strip of forest above cane belt and below Parker Ranch pasture.

In cane belt there is a characteristic pattern of wooded ravines and some narrow ridges running down slope, ravines lined on north sides with rows of casuarina.

Belt of pasture extends clear around middle east slopes of Mauna Kea above a narrow koa belt

which is above a wide lehua belt which is above the cane fields. Apparently most of upper koa belt has been destroyed for pasture. Above this reddish cinders (?) slopes with thin brush.

Toward Hilo the ravine walls in cane belt are not lined with casuarina but are normally wooded. At lower edge of forest belt are some conspicuous fairly large patches of dark colored forest, probably planted.

1958 Hawaiian Is.

Jan. 3 - Kilauea Military Camp
along rail in sparse vegetation
on ash beds

39279 Sclerantheus ? Polycarpaea
west side of

Jan. 4 - South Point, Kalae
low vegetation on windswept
plain and cliffs over sea

3 80 Portulaca cyanosperma Eglr
on ash between rocks of road cut
and on flat

4 81 Portulaca oleracea
on ash between rocks of
road cut and on flat.

3 82 Parsiflora foetida L. var. gossypiflora
common on road cut cliffs.

4 83 Jacquemontia sandwicensis
common in

2 84 Portulaca cyanosperma Eglr
common in flat grassland

Jan. 4 South Point, Kalae, near
lighthouse

4 85 Fimbristylis cymosa R.Br.
in crevices on basalt terrace
just above reach of waves

4 86 Lasbania tomentosa
occasional on flat ash soil
just above sea

2 87 Heliotropium curassavicum L.
on basalt bench just above sea

4 88 Fimbristylis cymosa R.Br.
very common in crevices of rocks cut by sea spray

1730 m.

Polycarpon procumbens L.

10 m. several grasses, Sida,
Cassia leschenaultiana,
Tribulus cistoides, etc.
prostrate, fleshy, purplish,
flowers deep magenta pink,
darker toward center,
stems brownish, fleshy,
ascending, flowers
yellow 3 m.m. across.
vine, fruit immature.
odor disagreeable.
prostrate, stems 1 m. long
branching, flowers pale
blue, stigmas white,
spatulate.
prostrate, fleshy, flowers
magenta pink.

5 m.

densely caespitose.

prostrate mat-forming
shrub, flowers salmon colo.

prostrate, fleshy, very glaucous,
flowers white with greenish center.
densely caespitose.

(Std. # 154)

1957

Jan 4 - South Point

Lava terrace about 5'-8 m. above sea - rough surface with bed of ash removed for 30 m. or so back from cliff. On lava surface Timbristylis is only plant on outer half. Then Sporobolus virginicus, Lepturus etc. back where there is some sand or ash.

Main level back of the terrace is a plain of yellow Pahala ash, a fine dust-like layer 1-2 m. deep on the flat surface. This plain is the surface of most of the South point peninsula, bounded on the east by a rough lava flow. The lava flow has Leucaena, Lantana, Sida, Fourcroya, etc. forming an uneven, not too high vegetation. The ash plain is covered by Cynodon, Sida, Jacquemontia, Portulaca and various other low herbaceous species. On the entire plain are only two or three Prosopis trees or bushes. On the edges above the exposed lava

Lebruia

surfaces, where the ash has been cut away by the sea, Lepturus repens var. glaucescens Nees is common. Boerhavia also.

On the way back from South Point to Kilauea the vegetation soon becomes scrubby and is mainly Lantana, about 1 m. or less tall, with grassy openings, and is grazed. The Lantana benefits from the grazing and has almost covered some areas. After this, towards the main road, there is a taller scrub of Schinus terebinthifolius with some Prosopis. Eugenia sp. From the junction with the main road on for some miles is mainly sugar cane, but with small patches of Aleurites and larger areas of Schinus and other mainly introduced shrubs and small trees and areas of Eucalyptus. On lava flows is Dodonaea, Stypholis, Myoporum, Wikstroemia

1958 Hawaiian Is

39289 Lesuvium portulacastrum on gisem
common on bare eroded fine
ash soil near sea

2 90 Cuscuta sandwicensis
rare on side of flat near sea

2 91 Boerhavia
occasional on flat near sea

~~97~~ Jan. 4 - large flow just north-east
of South Point, Kalae

7 92 Portulaca cyanosperma Eyle
local on accumulations
of ash soil

2 93 Bidens cynapiifolia
very local around ~~of~~
abandoned military installati

Jan. 4 northeast of Pahala
on main highway, 10 mi south
of Kilauea
~~locally~~ on roadside

3 94 Bidens pilosa var ~~radiata~~
locally common

4 95 Euphorbia
abundant

5 m. prostrate, stems green;
with coppery
leaves fleshy, not lustrous,
flowers white.

— flowers white
pale yellow; flowers white
on fleshy pedicels

— prostrate, leaves rather
fleshy, white beneath,
Cuscuta above; flowers white.

20 m.

prostrate, leaves terete.

— minn (Bl.) Shafft
erect, to 0.8 m. tall, branched,
rays conspicuous, white.
prostrate, gland appendages
white.

1958 Hawaiian Is.

Jan. 5 - Road from Kulani Prison Camp to Weather Bureau Station

7 mi. above Camp - 6900'
Open area in scrub Ohia ~~Koa~~ woodland - with sparse scrub of geranium, Dodonaea, Styphelia, Vaccinium, Coprosma ernodeoides, ~~Dodonaea~~ several sterile grasses. Hypochaeris is the only exotic plant apparent here. This scrub continues into the woodland.
The geraniums seem to be a hybrid swarm in G. cuneatum between var. cuneatum and var. hypoleucum.

Last shrubs seen between 9000 & 9500'.
Bare black lava mosaic of flows, both aa and pahoehoe some weathered slightly to a lighter color.

At 11150' at the station a complete desert of lava, mostly aa but patches of pahoehoe. Three colors represented - a blackish gray pahoehoe, a rusty dark brown aa and a lighter brownish gray pahoehoe. This shows a checking of about 1" on the smooth surfaces. No life at all.
(Get AMS map W532 dated 1951)

Pahoehoe at 10 ~~550~~ 600' has gray moss in north-facing cracks only, grass and Pellaea in deeper cracks & those covered by debris facing chiefly up, but to some extent in any direction. The moss is very common, the grass and fern only occasional. (photos)

Pahoehoe crossing road at 10,800' has moss common in same situation, grass tufts and moss up at an estimated 10,900 - 11,000', to upper limit of this exposure. (photos). Grass only on upper part of this exposure.
Moss only on north facing ~~cracks~~ cracks, none exposed to 4 p.m. sun, very few exposed to 4:15 sun. No Pellaea seen on this exposure.

~~10,000'~~ On a tiny patch of pahoehoe in an aa field are two small gnarled Vaccinium bushes ~~and~~ and Pellaea is common. Moss is common here, to some extent even on aa.

At 9400' on a dull brown weathered pahoehoe are a few scattered Vaccinium bushes, these showing great variation. Mosses here, also.

At 9200-9300 on fresh-looking black pahoehoe Vaccinium fairly common.

at 9100' lichens noticed. Bet. 9100 & 9200' on ~~the~~ ~~flow~~ light brownish pahoehoe grass and Vaccinium fairly common. Styphelia Douglasii occasional.

Fields of fresh aa.
Then at 8800' + two small kipukas with thickly scattered bushes of Styphelia, Vaccinium, Dubautia + grass on older pahoehoe getting over slightly into aa.

At 8700' + 8500' broad flat black glassy pahoehoe flows with scattered Vaccinium, occasional Styphelia and Dubautia. Many kipukas ~~at 8500'~~ of pahoehoe with abundant shrubs.
At 8300 shrubs common on rather young aa. Also first Metrosideros trees in kipuka here. This kipuka is large and has almost closed scrub of many species.
At 8100' first weedid weed: Hypochaeris radicata.

The north slope of Mauna Loa is a bleak waste of interlaced lava flows of various ages. The road to the Weather Bureau High altitude station is a relatively recently built graded road bulldozed into the rough lava on a rather gentle grade spiralling up the mountain from Kulani around to the west overlooking the saddle between Mauna Loa and Mauna Kea. The lower part is through fine wet forest of Metrosideros, much of which, unfortunately is being destroyed for grazing purposes. This forest decreases in stature somewhat upward, but irregularly, depending on the age and character of the Pava substratum. This forest ends abruptly where the 1942 lava flow cuts across it at about 6500'. After this there is intermittent woodland of low stature with scrub in the understory and in the openings. This scrub is the typical montane

(ctd. p. 162)

1958 Hawaiian Is.

north slopes of
Jan. 5 – Mauna Loa, road north-east of Weather Bureau Station
bare lava flows

3	9296	Dubautia ciliolata var juniperoides	(8800') 2700 m.	stiff shrub 0.4 m. high
		in small kipuka of pahoehoe		
4	97	Styphelia douglasii highest altitude observed, on pahoehoe flow	(9150') 2810 m	stiff compact shrub 0.8 m. high, fruits purplish red.
1	98	Hypochaeris radicata highest exotic observed	(8100') 2750 m	rays yellow
3 1	99	Vaccinium peleanum Sh.otth. on pahoehoe lava, occasional	(9401') 2890 m	small shrub.
3	9300	Vaccinium peleanum Sh.otth. occasional on pahoehoe lava.	(9400') "	small shrub, berries reddish black when ripe.
3	01	Vaccinium reticulatum Sm. occasional on pahoehoe lava	(9401) "	small shrub, berries red when ripe.
1	02	Vaccinium peleanum Sh.otth. occasional on pahoehoe lava	(9400') "	small sterile shrub.
2	03	Vaccinium reticulatum Sm. occasional on pahoehoe lava	(9400') "	small shrub, fruit immature, red.
1	04	Vaccinium reticulatum Sm. ? rare on small patch of pahoehoe	(10,000') 3075 m	small shrub.
3 1	05	Pellaea terniflia occasional in crevices in pahoehoe flow	(10,550') 3240 m	
4 1	06	(grass) Trisetum glomeratum (Kunth) Trin occasional in crevices in pahoehoe flow	(10,550') "	small tufts
x	07	(moss) Rhacomitrium lanuginosum (Hedw.) Brid very common in north-facing crevices in pahoehoe flow	(10,550') "	gray var. pruinosum Hook. & Wils. det. H.A. Miller 1958

1958

Jan. 5 – Kulani Road 8 mile above Prison camp (6800') 2090 m
opening in ~~of~~ sparse scrubby woodland on lava flow

39308 Carex
rare in

2 09 Geranium cuneatum
abundant in sparse scrub in

1 10 Geranium cuneatum
abundant in sparse
scrub in

(ctd. from p. 159) ~~dry~~ xerophytic scrub of Styphelia, Vaccinium, Geranium, Dubautia, Coprosma, Dodonaea and small Metrosideros in varying proportions. It is ~~often~~ open to almost or quite closed, usually rather sparse. As the road climbs stretches of bare or almost bare lava, more often the rough clinkery aa type, become more prevalent and the vegetation more and more reduced to small "islands" or "bipukas" in the lava fields. These vary from very small to several to many acres in extent. The vegetation is commonly open woodland

caespitose; perigynia green.

shrub 0.8 m. tall, petals white. (mostly not in flower at this season) mass collection to show intergradation between var. cuneatum and var. hypoleucum.

of scrubby Metrosideros up to 3–5 m. tall, ~~sometimes~~ with scrub such as described above. The trees sometimes scarce or lacking. The highest trees and well developed scrub on the road are in bipukas at 8250 to 8300'. This scrub has a number of species, in the genera mentioned above.

Above this are extensive aa lava fields with scattered bipukas of older pahoehoe lava. Shrubs are fairly numerous in the bipukas, only occasional on the aa. They are mainly Vaccinium with some Styphelia and Dubautia. ~~The~~ Shrubs are common on aa only at about 8300' and

below. ~~Sa~~ above this the aa is without visible life except for tufts of gray moss in pockets.

Crossing the aa fields at about 8500' and 8700' are two fresh looking black shiny pahoehoe flows of low rounded relief with a few scattered Vaccinium bushes with occasional Styphelia and Dubautia. at 8800' are two small kipukas of pahoehoe with fairly abundant shrubs of the same three genera and tufts of grass (Trisetum?). This vegetation is mainly on the pahoehoe lava but slightly invades the aa around the edges. Above this are broad fields of fresh aa. The last lichens were noticed at about 9100'.

Between 9100 and 9200' on light brownish weathered pahoehoe Vaccinium is fairly common, Styphelia douglasii occasional. Between 9200 and 9300' Vaccinium is fairly common on a fresh looking black pahoehoe. Above 8800' these shrubs are

at best widely scattered, but up to 9300' on pahoehoe a number of individuals will likely be in any field of vision. above this they are very local or absent. At 9400' a population of about 6 individual Vaccinium shrubs is seen. The gray moss is common here ~~on~~ in north-facing cracks.

at about ~~10,000'~~ on a tiny patch of rather rough pahoehoe were two small gnarled Vaccinium bushes, the highest woody plants seen on the road. Pellaea ternifolia is fairly common here in crevices. This is also the highest spot where moss was seen on aa lava, which surrounded the patch of pahoehoe.

From here on up to 11,150' is mostly aa lava with occasional exposures of an older pahoehoe, this cracked and cracked somewhat, the cracks showing up because of an efflorescence of a white mineral. On an exposure of this at 10,550' a gray

moss is very common in tufts in north-facing crevices. Pellaea ternifolia and Trisetum sp. are occasional in very small tufts in crevices of any exposure but mostly exposed upward. These crevices are either quite deep or are covered by an accumulation of small rock debris which protects the root crowns and rhizomes from undue desiccation.

On an elongate pahoehoe exposure bordering the road at 10,800' the same moss is again common in north-facing crevices. It was noticed that none of these tufts were exposed to the direct sun at 4:00 p.m. (Jan. 5) but some were beginning to be lit by the sun at 4:15. Following up this exposure to its head tufts of Trisetum were seen near the top, at perhaps 10,950' or 11,000', but no Pellaea. Another such exposure continued on up the slope beyond a short stretch of a'a, but

time was not available for examination of this. In all probability, at least the moss would have been present there, as it showed no signs of becoming scarcer or less vigorous to the top of the lower exposure.

However, on pahoehoe of similar character just above and beyond the Weather Bureau station at perhaps 11,160' to 11,200' no plants at all, not even mosses, were seen.

Time was not available for exploration farther up the mountain.

The interesting thing about all of these occurrences was that there seemed to be no ecological dependence whatever. The moss, grass, fern, and shrubs occurred in separate niches or isolated examples of the same niche. The moss did not seem in any way to precede or prepare the way for the higher plants, nor the ferns and grass to prepare the habitat for the shrubs. Cracking of the lava seemed to be the only

This is the result of either original cooling or post-

1953 Hawaiian Is.

Jan. 6 - Kilauea Volcano

39311 Galinsoga parviflora Cav.
in streets of military camp

3 12 Andropogon
floor of crater near Halemaumau

Melinis minutiflora has become common along roadsides generally and even on the crater floor.

Pulbostylis capillaris is general on bare ground, at this season the culms are a dull orange color.

Andropogon sp. is common along roadsides and scattered on crater floor.

Hypochoeris is conspicuous along roadsides.

Along Volcano Road between Kilauea and Hilo are a great variety of exotic trees and shrubs. Below Mountain View what appears to be Melochia or Heliocarpus is abundantly flowering. Locally almost dominant in forest. Trees to 30' tall, leaves whitish, especially the young ones. Flowers pink.

South slopes of West Maui are only thinly vegetated to a considerable altitude, at least 3/4 way to summit, especially on ridges.

1730 m. disk yellow, rays white.

~~1800 m.~~

1200 m. small clump, very erect.

On Mauna Loa the Metrosideros and Acacia koa do not form clear belts. Koa is very common just above Kilauea, forming forests, as above Bird Park, and Metrosideros is dominant in forests above Kulani up to limit of forest, though there is a patch of large koa at about 5600'.

On the rainy side of Kilauea Cibotium forms a conspicuous understory in Metrosideros forest.

Jan 6. flight Hawaii to Oahu.

East slope of Kohala Peninsula grassy above, more and more wooded with Prosopis (?) below, in places back of shore a closed forest, thinning out upward and northward along shore.

West and north slopes of Kahoolawe grassy and sparsely covered with Prosopis, especially in ravines. North part of plateau mostly bright red and bare.

1958 Hawaiian Is. Lanai

South slopes of mountain on Lanai have considerable bare or almost bare areas. Some patches of dense, probably planted forest on lower slopes and in gulches. Top covered by thin forest, a few large trees on ridge.

Outer slopes on east end covered by grass or lantana(?) and cactus, on south side grass and scrub (lantana?) except for abundant red erosion scars. Prosopis in ravines. Flat [illegible] extensively pineapples except on ~~west~~ and ~~extreme east~~ ~~south of mountain~~ East end of mountain much more eroded than west. Patch of Prosopis woodland a forest on hook-shaped peninsula on south-east end

Mums windbreaks on ~~west~~ ~~north~~ end still very conspicuous but their effects not altogether clear. Long slopes on west end grassy, with some Prosopis in ravines.

1998 Virginia

Jan. 26 - Manassas, planted on grounds of old Portner estate

39313 Hedera helix L.
3 climbing on old tower

~~H Hedera helix L.~~
~~same~~

3 14 Hedera helix L.
same

3 15 Hedera helix L.
same

2 16 Hedera helix L.
climbing on trees and prostrate on ground
1

tangled woody vine.
leaves dull green, veins pale,
fruiting branches
bushy, fruit not
quite mature.

same but fruit mature,
~~dark~~ blue-black.

same

woody vine, sterile
branches prostrate on
ground, fruiting bushy
climbing in trees; leaves
dull green with pale veins,
fruit blue-black, fleshy

1 198